For List of Council and Officers, Conditions of Admission to the Fellowship of the Society, and Society Notices, see pages ii., iv., vi., and viii.

The Geographical Journal.

Authors are alone responsible for their respective statements. In MS. communications all new or unfamiliar geographical names should be written in imitation of Roman type. All communications for the Editor should be addressed to 1, Savile Row, London, W.

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The
Geographical Journal.

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PEARY ARCTIC CLUB EXPEDITION TO THE NORTH POLE, 1908–9.*

By COMMANDER ROBERT E. PEARY.

THE last North Polar Expedition of the Peary Arctic Club † left New York harbour on July 6, 1908, in the steamer *Roosevelt*, built by the club especially for Arctic work, and commanded by Captain Robert A. Bartlett.

The members of the expedition were as follows, a total of 22: Commander R. E. Peary, U.S.N., Commander of the expedition; Captain R. A. Bartlett, master S.S. *Roosevelt;* Chief Engineer George A. Wardwell; Surgeon J. W. Goodsell; Assistants: Prof. Ross G. Marvin, Prof. D. B. MacMillan, George Borup, M. A. Henson; Charles Percy, steward; William Pritchard, assistant steward; Thomas Gushue, mate; John Murphy, boatswain; Seamen: John Coady, John Barnes, John Thomas, Denis Murphy, George Percy; Banks Scott, second engineer; Firemen: James Beatty, Patrick Joyce, Patrick Straus, John Wiseman.

At Oyster bay, Long Island, the ship was inspected and the expedition reviewed by President Roosevelt, and then steamed out for Sydney, Cape Breton. At Sydney the *Roosevelt* was filled completely with coal, some last items of supplies were taken on board; I joined the expedition here, and on July 17 the *Roosevelt* steamed out and headed northward.

Proceeding across the gulf of St. Lawrence, through the Straits of Belle Isle to Hawkes Harbour, Labrador, we met the auxiliary steamer, *Erik*, loaded with coal and whale meat. From here the two ships steamed north in company, passing along the southern portion of the

* Royal Geographical Society, Albert Hall, May 4, 1910. Map, p. 248.

† The officers of the Peary Arctic Club are General Thomas H. Hubbard, President; Zenas Crane, Vice-President; and Herbert L. Bridgman, Secretary and Treasurer.

Labrador coast; thence through Davis strait, Baffin and Melville bays, without calling at any of the Greenland ports, and reached Cape York August 1.

In the Cape York-Etah region, a little less than three weeks were spent selecting the best of the Eskimo to accompany me north, purchasing dogs, furs, and other items of equipment, killing walrus, and refilling the *Roosevelt* with coal.

On August 18, the *Roosevelt* steamed out of Etah to resume her voyage north, the *Erik* returning home from this point. I had on board at this time 22 Eskimo men, 17 women, 10 children, 246 dogs, and some 40 odd walrus. Two of my men, the boatswain and the cabin boy, had been left at Etah in charge of a relief station, thus reducing the number of the ship's party to 20, making a total of 69 souls on board.

The negotiation of the ice-encumbered channels from Etah northward to the northern coast of Grant Land, which I had in view again for winter quarters of the ship, was very similar to its navigation on the previous expedition three years before; the time occupied was almost identical, but the nervous strain, and the risk and danger to the ship were distinctly less as the result of our greater experience.

Leaving Etah we proceeded, as usual, to Cape Sabine, forced our way, with frequent delays and interruption, through the usual heavy ice, past Cape Albert and Victoria head; worked along under the Cape D'Urville-Hayes point coast, then off Cape Fraser met clear water, which enabled us to steam north in the middle of the channel to Lady Franklin bay. Here the ice forced us across to the Greenland coast at Thank God harbour, from whence we worked up past Cape Lupton, and from there north to Cape Union. From here we were drifted south some distance, but later took refuge under the north shore of Lincoln bay, in nearly the identical place where we had our unpleasant experience three years before. Here we remained for several days during a period of constant and at times violent north-easterly winds. Twice we were forced aground by the heavy ice; we had our port quarter-rail broken, and a hole stove in the bulwarks; and twice we pushed out in an attempt to get north, but were forced back each time to our precarious shelter. Finally, on September 2, we squeezed around Cape Union and made fast in a shallow niche in the ice-foot; then after some hours we made another short run to Black cape, and hung on to a grounded bit of ice. At last, a little after midnight of September 4, we passed through a stream of extremely heavy running ice into open water, rounded Cape Rawson, and passed Cape Sheridan within a quarter of an hour of the same time we arrived three years before (7 a.m., September 5).

An attempt was made to force the ship to Porter bay under Cape Hecla for winter quarters, but was given up, and a place selected close to the delta point of the Sheridan river, a little north of our

Special Medal for Arctic Exploration presented in gold to Commander R. E. Peary, and in silver to Captain R. A. Bartlett, May 4, 1910.

previous winter quarters. Here the *Roosevelt* was forced into the shallow water, unloaded and carefully secured. Tidal observations were commenced at once, and the members of the crew constructed box houses on the shore as an emergency precaution; the members of the expedition, with the Eskimo, began the transportation of supplies westward to Cape Columbia. This work, alternating with hunting, consumed the remainder of the time until November, at which time a large amount of supplies had been transported to Cape Columbia, and to intermediate depôts at Cape Colon and Parry peninsula. The trail to Columbia crossed both Feilden and Parry peninsulas. During this time I reconnoitred Clements Markham inlet, making the entire circuit of its shores.

The winter months were fully occupied on board the *Roosevelt* in making the equipments, sledges, harnesses, clothing, etc., for the sledge journey, and in the field during the period of moonlight in each month, in hunting, in tidal observations at outer stations, and in continuing the work of transporting supplies to Cape Columbia.

The expedition was perhaps unique in the amount and range of its winter sledge-work. Cape Columbia to the north-west, Cape Bryant to the north-east, the head of Newman bay to the south-east, and Lake Hazen to the south-west marked the sphere of this action. A month of tidal observations was taken by MacMillan at Cape Columbia; another month by Marvin at Cape Bryant (both simultaneous with observations at Sheridan); Robeson channel was crossed four times in the depth of winter, and the work had its desired and intended effect of keeping the members of the expedition, the Eskimo, and the dogs in the best of training, so that when the spring campaign opened they were hard and fit.

On February 15 Bartlett left the *Roosevelt* with the first division of the northern sledge party. Other members of the party followed on successive days with their division, and I brought up the rear on the 22nd with my division. Seven members of my party, 19 Eskimo, 140 dogs, and 28 sledges had now left the ship.

Four months of northerly winds at Cape Sheridan during the fall and winter, instead of southerly ones as during the previous season, led me to expect less open water than before, but a great deal of rough ice, and I was prepared to hew a road through the jagged ice for the first 100 miles or so from Columbia to across the "big lead," and had massed provisions at Columbia for this purpose.

On the last day of February, Bartlett, with his pioneer division, accompanied by Borup and his division, got away due north over the ice, and on March 1 the remainder of the party got away on Bartlett's trail, I following an hour later. The party now comprised 7 members of the expedition, 17 Eskimo, 133 dogs, and 19 sledges. Two Eskimo and 7 dogs had gone to pieces. My marching formation for the expedition

contemplated a lightly loaded, energetic advance or pioneer party, breaking a trail one day in advance of the main party; a compact main party, made up of unit divisions of four men each; and supporting parties, returning at intervals.

A strong easterly wind, drifting snow, and temperature in the minus fifties marked our departure from the camp at Cape Columbia, which I had christened Crane City. Rough ice in the first march damaged several sledges and smashed two beyond repair, the teams going back to Columbia for other sledges in reserve there. At the end of the fourth march, about 45 miles north of Columbia, we were held up six days by the "big lead" which marks the edge of the continental shelf. At noon of March 5 the sun, red, and shaped like a football by excessive refraction, just raised itself above the horizon for a few minutes, and then disappeared again. Beyond the "big lead," at the end of the seventh march, 84° 29′ N. lat., Dr. Goodsell, MacMillan, and three Eskimo, with three sledges and teams, returned. The best Eskimo, sledges and dogs were retained by the main party, and their sledge loads brought up to the standard. A sounding here gave a depth of 825 fathoms. On leaving this camp the expedition comprised 16 men, 12 sledges, and 100 dogs.

The next five marches (three short ones with Henson in the lead, with some rough ice and several broken sledges, and two with Marvin in the lead) brought us to 85° 23′. From this point Borup turned back in command of the second supporting party. Here again, as before, the best Eskimo, dogs, and sledges were retained for the main party, and the loads brought up to the standard. From this point the expedition comprised 12 men, 10 sledges, and 80 dogs.

The now continual daylight enabled me to make at this camp a modification in my march formation that brought my advance and main parties closer together, and reduced the likelihood of their being separated by open leads. Bartlett went to the front here again with his division, taking Henson and his division with him. Marvin and I with our divisions remained in camp 12 hours longer, and then followed. When we reached Bartlett's camp he turned out and went on and we turned in. By this arrangement the advance party was travelling while the main party was asleep, and *vice versâ*, and I was in touch with my advance party every 24 hours. At the end of the second march in this section, Marvin obtained a satisfactory latitude sight, which placed us at 85° 48′. This result agreed very satisfactorily with the dead reckoning of Marvin, Bartlett, and myself, and the positions of our camps up to this point were adjusted from this observation. Up to this time the slight altitude of the sun had rendered it not worth while to waste time or strain the eyes in observations.

At the end of the third march beyond here, Marvin obtained

another satisfactory sight for latitude, which gave our position as 86° 38′. This gave us a definitely measured record of 50′ of latitude made good in three marches. From this point Marvin turned back in command of the third supporting party. My last words to him were, "Be careful of the leads, my boy." Again the best Eskimo, the best dogs, the best sledges were retained for the main party; sledges were repaired, and the party went on from here, comprising 9 men, 7 sledges, and 60 dogs.

With a more compact party and every one increasing in fitness and training with each day, we were now in shape to do some record travelling, and should have made a great record in the next five marches, with Bartlett in the lead, but for two hostile occurrences; one, the cutting of a march in two, and a day's delay by the opening of an impassable lead; and, second, the occurrence of a strong northerly wind during two days, which crushed the ice southward and stole from us a number of our hard-earned miles. This five-march section presented a greater variety of going than any previous one. In the first march was encountered a zone of the deepest snow of the entire journey. In the next, we encountered an active lead, and the cake of ice bearing Bartlett's igloo was adrift for a while. Beyond this, we crossed a lake of young ice, buckling under our sledges, some 6 miles in width. These conditions were followed by large heavy old floes, covered with hard snow and increasing in diameter as we proceeded.

The fifth march brought us close to the 88th parallel, unless the north wind had lost us several miles. The wind blew all night and all the following day. At this camp, in the morning, Bartlett started to walk 5 or 6 miles to the north, to make sure of reaching the 88th parallel. While he was gone I selected the forty best dogs in the outfit and had them double rationed, picked out five of the best sledges, assigned one to Bartlett's party, and broke up the seventh for material with which to repair the others, and set the Eskimo at the work.

Bartlett returned in time to take a satisfactory observation for latitude in clear weather, and obtained for our position 87° 48′. This showed that the continued north wind had robbed us of a number of miles of hard-earned distance. Bartlett took the observation here, as had Marvin five camps back, partly to save my eyes, but largely to give an independent record and determination of our advance. The observations completed and two copies made, one for him and the other for me, Bartlett started on the back trail in command of my fourth supporting party, with 2 Eskimo, 1 sledge, and 18 dogs. When he left I felt for a moment pangs of regret as he disappeared in the distance, but it was only momentary. My work was still ahead, not in the rear. Bartlett had done good work, and had been a great help to me. Circumstances had thrust the brunt of the pioneering

upon him instead of dividing it among several, as I had planned. He had reason to take pride in the fact that he had bettered the Italian record by a degree and a quarter, and had covered a distance equal to the entire distance of the Italian expedition from Franz Josef land to Cagni's farthest north.

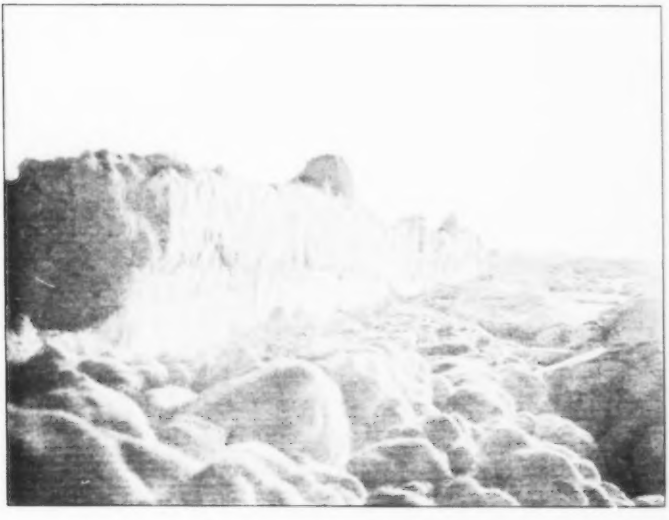
I had given Bartlett this position and post of honour in command of my fourth and last supporting party for two reasons; first, because of his magnificent handling of the *Roosevelt*, and because he had cheerfully stood between me and many trifling annoyances on the expedition; and second, because it seemed to me appropriate, in view of the magnificent British record of arctic work, covering three centuries, that it should be a British subject who could boast that, next to an American, he had been nearest the pole. More than this, Bartlett was the only man now with me competent to ensure the return of the supporting party to the ship.

With the disappearance of Barflett I turned to the problem before me. This was what I had worked for during twenty-three years; for which I had lived the simple life; for which I had conserved all my energy on the upward trip; for which I had trained myself as for a race.

Now, in spite of my years, I felt in trim, fit for the demands of the coming days, and eager to be on the trail. As for my party, my equipment, and my supplies, I was in shape beyond my most sanguine dreams of earlier years. My party might be regarded as an ideal one, loyal, and responsive to my will as the fingers of my right hand. Four of them held the technique of dogs, sledges, ice, and cold as their heritage. Two of them, Henson and Ootah, were my companions to my farthest north three years before. Two others, Egingwah and Sigloo, were in Clark's division, which had such a narrow escape at that time. My dogs were the very best, the pick of 133, with which we left Columbia. Almost all were powerful males, hard as nails, in good flesh, but without a superfluous ounce, without a suspicion of fat anywhere, and, what was better yet, they were all in good spirits. My sledges, now that the repairs were completed, were in good condition. My supplies were ample for forty days, and, with the reserve represented by the dogs themselves, could be made to last fifty.

Pacing back and forth in the lee of the pressure ridge where our igloos were built, while my men got their loads ready for the next marches, I settled on my programme. I should strain every nerve to make five marches of 25 miles each, crowding these marches in such a way as to bring us to the end of the fifth, long enough before noon to permit the immediate taking of an observation for latitude. Weather and open water permitting, I believed I could do this. If my proposed distances were cut down by any chance, I had two means in reserve for making up the deficit: first, to make the last march a forced one,

THE CLOUD CAP OF CAPE ALEXANDER, HALFWAY BETWEEN THE ARCTIC CIRCLE AND THE POLE.



FACE OF GLACIAL FRINGE AT CAPE COLUMBIA.

OO-TAH, MY BEST ESKIMO.

TYPICAL VIEW OF EXPEDITION ON THE MARCH IN PLEASANT WEATHER.

stopping to make tea and rest the dogs, but not to sleep. Second, at the end of the fifth march to make a forced march with a light sledge, a double team of dogs, and one or two of the party, leaving the rest in camp. Underlying all these calculations was a recognition of the ever-present possibility of open leads, and impassable water, and the knowledge that a twenty-four hours' gale would knock all my plans into a cocked hat, and even put us in imminent peril.

At a little after midnight of April 1, after a few hours of sound sleep, I hit the trail, leaving the others to break camp and follow. As I climbed the pressure ridge back of our igloos, I set up another hole in my belt, the third since I started. Every man and dog of us was lean and flat-bellied as a board and as hard. Up to this time I had intentionally kept in the extreme rear, in order to straighten out any complication that might occur, to encourage any one that might be feeling blue from the heavy going or a broken sledge, and to see that everything was drawing properly. Now I was in my proper place, in the lead; and it was with a thrill of quickened blood and senses that I pressed on at the head of my little caravan.

It was a fine morning. The wind of the last two days had subsided, and the going was the best and most equable of any we had yet. The floes were large and old, hard and clear, and were surrounded by pressure ridges, some of which were almost stupendous. The biggest of them, however, were easily negotiated, either through some gap or up some huge hard drift. I set a good pace for about ten hours, which gave us 25 miles and took us well beyond the 88th parallel. While we were building our igloos, a long lead formed to the east and south-east of us, at a distance of a few miles.

A few hours' sleep, and we were on the trail again. The weather was fine, and the going like that of the previous day, except at the beginning, when pickaxes were required. This and a brief stop at another lead cut down our distance. But we made some 20 miles in ten hours, which put us halfway to the 89th parallel. During this march the ice was grinding audibly in every direction about us, but no motion was visible. Evidently it was settling back into equilibrium, and propably sagging northward with its release from the wind pressure. Again a few hours of sleep, and we hit the trail before midnight. The weather and going were even better than before. The surface, except as interrupted by infrequent ridges, was as level as the glacial fringe from Cape Hecla to Cape Columbia, and harder. We marched something over ten hours, the dogs being often on the trot, and made 25 miles. Near the end of the march we rushed across a lead 100 yards wide, which buckled under our sledges, and finally broke as the last sledge left it.

We stopped in sight of the 89th parallel, in a temperature of 40° below zero. Again a scant sleep, and we were on our way once more,

and across the 89th parallel. This march duplicated the previous one as to weather and going. The last few hours it was on young ice. Occasionally the dogs were galloping, and we made 25 miles or more. The air, the sky, and the bitter wind burning the face till it cracked, reminded me in this march of the great interior ice-cap of Greenland. Even the natives complained of the bitter air. It was as keen as frozen steel. A little longer sleep than the previous ones had to be taken here, as we were all in need of it.

On the following march the weather was thick, but it gave me no serious uneasiness, as before turning in I had taken a precautionary observation which indicated our position as 89° 25′. A dense, lifeless pall hung overhead. The horizon was black and the ice beneath was a ghastly, chalky white, with no relief—a striking contrast to the glimmering, sunlit fields over which we had been travelling for the previous four days. The going was even better than previously, and there was scarcely any snow on the hard, granular, last summer's surface of the old floes, dotted with the sapphire ice of the previous summer's lakes. A rise in temperature to 15° below zero reduced the friction of the sledges, and gave the dogs the appearance of having caught the spirits of the party. When we had covered, as I estimated, a good 15 miles, we halted, made tea, ate lunch, and rested the dogs. Then we went on another estimated 15 miles. In twelve hours' actual travelling time we made 30 miles. There was no sign of a lead in this march.

I had now made my five marches, and was in time for a hasty observation (at approximately local noon Columbia meridian) through a temporary break in the clouds, which indicated our position as 89° 57′. I quote an entry from my journal some hours later:

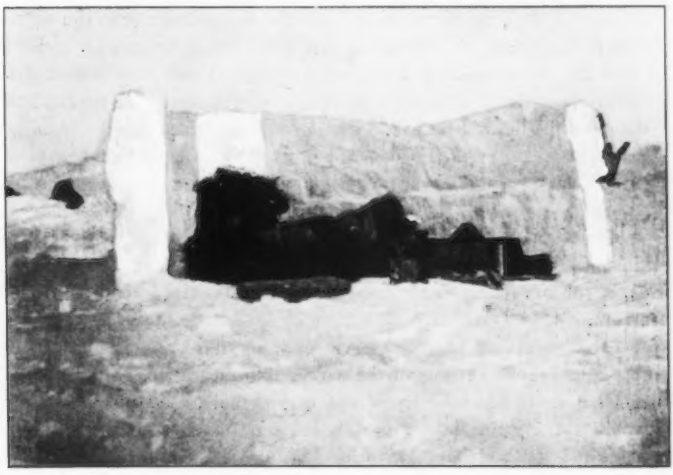
"The pole at last! The prize of three centuries, my dream and goal for twenty years, mine at last! I cannot bring myself to realize it.

"It all seems so simple and commonplace. As Bartlett said when turning back, when speaking of his being in these exclusive regions, which no mortal had ever penetrated before:

"'It is just like every day!'"

When our igloos were completed we had our dinner, the dogs were double rationed, and I wrote up my notes and went to sleep while Henson and the Eskimo unloaded the sledges and got them in readiness for repairs, which I had instructed them to make during our stay here, so as to reduce the probability of delays from breakage on the return trip. Later they came in, and I turned out, to be in readiness for an observation at 6 p.m., Columbia meridian time. The sky was still overcast, but there were indications that it would clear before long, and, after a little, I got out with my two men, and, with a light sledge, carrying only my instruments, drawn by a double team of dogs, I went on an estimated distance of 10 miles. It cleared while we were

travelling, and I was able to get a satisfactory series of observations at Columbia meridian midnight, which observations indicated our position as being beyond the pole. I then returned to camp in time for another set of observations at 6 a.m. of the 7th, Columbia time, which later were followed by a final satisfactory series of observations at Columbia noon of the 7th. In all, I had taken thirteen single, or six and a half double, altitudes, at two different stations, in three different directions, at four different times, under satisfactory conditions, except for the first single altitude on the 6th. The temperature during these observations had been from $-11°$ Fahr. to $-30°$ Fahr., with clear sky and calm weather (except for the single observation on the 6th).



MARVIN TAKING OBSERVATIONS AT 86° 38′, MARCH 25, 1909.

In traversing the ice in various directions as I had done, I had allowed approximately 10 miles for possible errors in my observations, and at some time during my marches and counter-marches I had probably passed over or very near to the Pole.

The observations were taken with a John Bliss 8-inch sextant, reading to 10″, with a mercurial horizon, with a specially devised wooden trough and a modified roof, which gave a mercurial surface, practically level with the edges of the trough, and with the plane of the mercurial surface well above the bottom of the roof glasses.

The method of taking these observations was as follows: A semi-circular wind-guard of snow-blocks was erected opening to the south. The instrument box was firmly bedded in the snow and packed down to a firm bearing, and snow packed around the box; then a skin or a

spare coat is thrown over the snow about the box, partly to prevent any possible softening of the snow, partly to protect the eyes of the observer from the intense reflected glare of light from the snow. The artificial horizon and roof is placed on top of this instrument box.

Between the instrument box and the inner end of the snow shelter a skin is thrown down, on which the observer lies flat on his stomach with his head to the south, and head and sextant close to the artificial horizon. He rests both elbows on the snow, holding the sextant firmly in both hands, and moving head and instrument, until the sun's limb is obtained in the narrow, fore-shortened surface of the mercury (see illustration).

With fur clothing, my personal experience has been that the element of cold in handling the sextant is not so serious as imagined, and with the blanket inner mittens used with our fur hand-gear covering the hands, there is little trouble from the insensible moisture of the hands condensing on the instrument. The principal difficulties which I have experienced have been the condensation upon the instrument of the insensible perspiration of the face (even with the respiration restrained), and the weariness of the eyes from the incessant blinding daylight in which the observer has been travelling. Snow-goggles, while helping, do not entirely relieve the eyes from strain, and during a series of observations they become extremely tired, and sometimes uncertain.

As the result of these observations my flag was displayed, and photographs taken of it and of the party. No recent ice was observed in these trips, or in the vicinity of the camp where a sounding could be made. Careful examination of the horizon in every direction with a telescope showed no indication of land or land clouds. The temperature at the time of our arrival, when the sky was overcast, was 11° Fahr. below zero, as indicated by one of Green's minimum self-registering thermometers. When it cleared the temperature fell, and, at the time of our departure, the thermometer registered 33° Fahr. below zero. From about eight o'clock in the evening (Columbia meridian time) until the time of our departure, the weather was clear and brilliant, with at times a light breeze, just sufficient to straighten out my silk flag.

After displaying the flags and taking photographs, we turned in to get a few hours of sleep, before starting on the return. After a short time in the igloos, however, as no one seemed to be sleepy (every one being apparently keyed up by the excitement of the occasion), and it seemed too bad to waste such fine marching weather by remaining in camp, I gave the word to hitch up, and we would go back to our next camp for a sleep. Leaving the camp about four o'clock of the afternoon of the 7th, we started on our return, having again double-fed the dogs,

MAKING THE SOUNDING 5 MILES SOUTH OF THE POLE. REEL MOUNTED ON BOW OF SLEDGE, WHICH HAS BEEN MOVED UP OVER THE HOLE.

VIEW LOOKING NORTH FROM CAMP AT 89° 25′.

CHEERING THE STARS AND STRIPES AT THE POLE.

TYPICAL VIEW OF TRAIL SOUTH OF 85° ON RETURN.

repaired the sledges for the last time, and discarded all our spare clothing to lighten the loads.

Five miles from the pole, a narrow crack filled with recent ice, through which we were able to work a hole with a pickaxe, enabled me to make a sounding. All my wire, 1500 fathoms, was sent down, but there was no bottom. In pulling up the wire it parted a few fathoms from the surface, and lead and wire went to the bottom. With the loss of the lead and wire, the reel became useless, and was thrown away, lightening Oo-que-ah's sledge by 18 pounds. The first camp was reached in good time, and the march would have been a pleasant one for me, but for my eyes burning from the strain of the continued observations of the previous hours. After a few hours' sleep we hurried on again, Eskimo and dogs on the *qui vive*.

I was anxious, if possible, to cover two outward marches on each of our return marches, which I believed we could do, barring accidents, since we had a trail to follow, and would need to waste no time in making camp, as the igloos built on the outward journey could be reoccupied. At this camp I inaugurated the system followed throughout the return march, of feeding the dogs according to the distance covered, that is, double rationing them when we covered two marches. I was able to do this, on account of the reserve supply of food which I had in my dogs themselves, in the event of our being seriously delayed by open leads.

At the next camp we made tea and ate our lunch in the igloos, rested the dogs, and then pushed on again. The weather was fine, though there were apparently indications of a coming change. It took all of our will power to reach the next igloos, but we did it, and were asleep almost before we had finished our supper. The next day was a wild one. When we awoke a strong north-north-east true wind was blowing with steadily increasing violence. Again, as on the previous day, we made the next camp, had lunch and hot tea in the igloos, rested the dogs, and then pushed on. The wind had now become a gale; the snow was whirling past us in blinding clouds, we and the dogs and sledges scudding before it, with the ice raftering under and all about us with the pressure of the gale. It would have been impossible to have travelled against this gale, and perhaps without it we would not have reached Bartlett's igloos, as the force of the wind helped us along. When we arrived at Bartlett's igloos, men and dogs were nearly exhausted. At this camp the continuance of the gale gave us good reason for a fair sleep and rest. In the next march we covered only one outward march. We might, perhaps, have covered another, but I found that, in the forced rush of the previous three marches, I had strained both dogs and men nearly to the elastic limit, and I did not dare to risk it. From here on, however, with a few exceptions, we covered two of our outward marches in each return.

Though Bartlett, Marvin, and, as I found out later, Borup, had been delayed by open leads, we probably, as the result of the northerly gale, were never delayed more than a couple of hours at a single lead. Sometimes the ice was fast and firm enough to carry us across; sometimes a short *détour*, sometimes a brief halt for the lead to close, sometimes an improvised ferry on an ice-cake enabled us to cross and keep the trail without difficulty, down to the tenth outward march. There the trail disappeared completely, and the entire region was unrecognizable. Where on the outward journey had been narrow cracks, there were now broad leads, one of them over five miles in width, caught over with young ice. Here again fortune favoured us, and no pronounced movement of the ice having taken place since Bartlett passed, we had his trail to follow. We picked up the old trail again north of the seventh igloos, followed it beyond the fifth, and at the big lead lost it finally. From here we followed Bartlett's trail, and on April 23 our sledges passed up the vertical edge of the glacial fringe, a little west of Cape Columbia. When the last sledge came up I thought my Eskimo had gone crazy. They yelled and sang and danced themselves exhausted. As Otah sat down on his sledge he remarked in Eskimo: "The devil is asleep or having trouble with his wife, or we never should have come back so easily." A few hours later we arrived at Crane City under the bluffs of Cape Columbia, and after putting four pounds of pemmican into each of the faithful dogs to keep them quiet, we had at last a chance to sleep our fill.

Two days we spent here in sleeping and drying our clothes; then for the ship. Our dogs, like ourselves, had not been hungry when we arrived, but simply lifeless with fatigue. They were different animals now, and the better ones among them stepped out with tightly curled tails and uplifted heads, and their iron legs treading the snow with piston-like regularity. We reached Cape Hecla in one march of 45 miles and the *Roosevelt* in another of equal length. When we got to the *Roosevelt* I was staggered by the news of the fatal mishap of Marvin, who had been drowned at the "big lead" while hastening back at the head of his supporting party. He had been either less cautious or less fortunate than the rest of us, and his death emphasized the risk to which we had all been subjected, for there was not one of us but had been in the leads at some time during the journey. The "big lead," cheated of its prey three years before, had at last gained its human victim.

Many factors had entered into the success of the expedition, but standing pre-eminently at the head was *experience*. Through a period of nearly twenty years, a thorough knowledge of all the details of Arctic work, equipment, methods, clothing, rations, capabilities of Eskimo and dogs, the contingencies of ice travel, had been gained. In the previous expedition for the first time a true knowledge of actual

conditions existing in the central polar basin had been secured, and with this combination it was possible to provide for practically every contingency. Added to this was the fortunate factor of a not unusual depth of snow on the icefields to impede us, and the non-occurrence of strong easterly or westerly winds while we were on the ice. The occurrence of such winds, resulting as they would, in pronounced lateral motion of the ice, would have given us serious trouble. Such wind as we did have was from the north, and had the effect of keeping the ice crowded against the land and preventing lateral motion.

After my return to the ship, MacMillan and Borup made a trip to Cape Morris K. Jesup, where tidal observations were taken and soundings made north from that point as far as 84° 17′. Returning from this trip, MacMillan went to Fort Conger for a series of tidal observations there, to connect our work at Sheridan, Bryant, Columbia, and Jesup with the observations of the Lady Franklin Bay expedition.

On July 18 the *Roosevelt* left her winter quarters, and was deliberately driven out into the centre of the channel pack off Cape Union. From here she fought her way south in the middle of the channel, and passed Cape Sabine August 8, thirty-nine days earlier than in 1908, and thirty-two days earlier than the British expedition in 1876. On August 26 I landed the last of my faithful Eskimo at Cape York. On September 5 the expedition arrived at the wireless station at Indian harbour on the Labrador coast, from whence, on the 6th, the message "Stars and Stripes nailed to North Pole" was sent vibrating southward through the crisp Labrador air.

The culmination of long experience—a thorough knowledge of the conditions of the problem (gained from the last expedition), together with a new type of sledge, which reduced the work of both dogs and driver, and a new type of camp cooker which added to the comfort and increased the hours of sleep of the members of the party—combined to make the last expedition an agreeable improvement upon the previous ones in respect to the rapidity and effectiveness of its work, and the lessened discomfort and strain upon the members of the party. But the dearly bought years of experience, the magnificent strength of the *Roosevelt*, the splendid energy and enthusiasm of my party, the loyal faithfulness of my Eskimo would have gone for naught but for the sinews of war furnished so loyally by the members and friends of the Peary Arctic Club. And it is no detraction from the living to say that to no single individual among these has the final result been more signally due than to my friend the late Morris K. Jesup, founder and first president of the club.

APPENDIX.

Notes on Soundings.

The sounding equipment of the expedition consisted of two reels of specially made piano wire of 1000 fathoms each (this wire, 0·028 diameter, and weight 12·42 lbs. per 1000 fathoms), and three 20-lb. leads, cut down to 14 lbs., with clam-shell device for grasping samples of the bottom. These reels were arranged to be fitted quickly to the upstanders or nose of a sledge when making a sounding, and had handles for reeling in the wire and lead.

One of these reels and leads were carried by Bartlett with his advance party, and the other reel and two leads by the main party. Portions of the wire and the two leads were lost at various times in hauling up, owing, probably, to kinks in the wire. When the sounding at 85° 33′ was made 700 fathoms only were left of the sounding wire of the main party, and Bartlett, with the other 1000 fathoms, was in advance and inaccessible. In hauling up the wire from this sounding it parted again, and some 200 fathoms, together with two pickaxe heads and a steel sledge shoe, which had been used to carry it down, were lost. When Marvin turned back, Bartlett's 1000 fathoms and the remaining 500 fathoms of the other reel were combined. When Bartlett made the sounding at 87° 15′ I gave him explicit instructions to use the utmost caution in regard to the wire, in order not to lose any more of it, as I wanted it all for a sounding at the Pole, should I succeed in getting there. Acting upon these instructions, Bartlett ran out 1260 fathoms and then stopped on account of a small kink in the wire, which he feared would part when the wire was hauled up. When I made my sounding about 5 miles from the pole the wire parted, as had been feared, and the last lead and nearly all of the wire was lost. The above facts are noted to explain the irregularity of these soundings which did not get bottom. The sounding of 310 fathoms at 85° 23′ naturally impressed me at once as surprising, and when Marvin reported the result to me, immediately after taking the sounding, I at once asked him if he was sure that he had the bottom, and he replied that he was, as the fact of this pronounced shoaling from 825 fathoms to 310 impressed him at once, and he made sure that his depth was correct. Again, when the sounding of 700 fathoms and no bottom was made about 10 miles farther north, we both spoke of the peculiar fact of this outlying ridge with deeper channel intervening between it and the continental shelf, and Marvin again said that he was sure of his 310 fathoms reading. Had it not been for the loss of the last lead and practically all of the wire while making the soundings at the Pole, I should, on the return, have interpolated other soundings.

The profile indicates that a line of 5-mile interval soundings from Cape Columbia to the 86th parallel might develop a particularly interesting profile of the bottom of the Arctic ocean.

General Notes on Temperature.

The lowest temperature observed on the recent expedition was 59° below zero, March 14, 82 miles north of Cape Columbia. The lowest temperature observed at Cape Sheridan was 54° below zero.

The mean monthly temperatures during September, October, November, and December, 1908, were lower than three years previous, the mean temperature for December being nearly 8° lower. The mean temperature for the eleven months during which the expedition was at Cape Sheridan was nearly the same as on the previous expedition.

The frequency and violence of the winds was much less than three years previous, and there was constantly less open water throughout the year.

SUMMARY OF TIDAL OBSERVATIONS BY COAST AND GEODETIC SURVEY.

Station.	Lunitidal interval.	Mean range.	Period discussed.
	h. m.	feet.	days.
Pt. Aldrich, C. Columbia ...	7 58	0·84	28
Cape Sheridan	10 31	1·77	220
Cape Bryant	12 20	0·98	29
Cape Morris Jesup	10 49	0·38	10

The maximum or tropic range of the diurnal wave is 0·57 foot at Pt. Aldrich, 0·50 foot at Cape Sheridan, and 0·93 foot at Cape Bryant.

SUMMARY OF METEOROLOGICAL OBSERVATIONS BY COAST AND GEODETIC SURVEY.

The mean temperatures read at midnight (60th meridian) and noon are as follows :—

1908.	Midnight.	Noon.	1909.	Midnight.	Noon.
	°	°		°	°
August 17–28 ...	25·3	27·2	May 3–31 ...	15·7	20·1
September 1–30 ...	9·4	10·9	June 1–30 ...	25·9	30·5
(3 days missing)			July 1–12 ...	31·9	33·5
October 1–31 ...	−2·8	−3·1			
(3 days missing)					
November 1–30 ...	−19·9	−21·4			
(11 days missing)					
December 1–14 ...	−25·4	−25·1			

EXPERT FINDING UPON RECORDS.

Department of Commerce and Labour, Coast and Geodetic Survey,
Washington, March 16, 1910.

Mr. O. H. TITTMANN,
Superintendent Coast and Geodetic Survey Office.

SIR,—I have the honour to report that the tidal records obtained by Commander R. E. Peary during his latest Arctic expedition consist of practically unbroken series of hourly readings of the height of the tide, taken day and night, at the following places and between the dates specified :—

Station.	Period of observation.	Length of record.
		Days.
Cape Sheridan ...	November 12, 1908, to June 30, 1909 (total loss of record, 31 hours)	231
Cape Columbia ...	November 16, 1908, to December 14, 1908 ...	29
Cape Bryant ...	January 16, 1909, to February 13, 1909	28
Fort Conger ...	June 10, 1909, to June 25, 1909 (total loss of record, 5 hours)	10

The observations were taken day and night, and besides the regular hourly readings, numerous additional readings were generally taken near the times of the high and the low waters.

From the records themselves, and from plottings constructed from them, it appears that the observations were taken with great care and thoroughness.

The principal results from these records have been already obtained, and are on file in this office.

In order to show the full geographical value of the results, it will be necessary to consider them in connection with all other tidal results relating to the Arctic ocean. This work is now under way.

Commander Peary's observations leave little to be desired in regard to tidal observations between Cape Morris Jesup and Cape Columbia; but there are long stretches of the Arctic coast where nothing is available. This is especially true of the Russian coast and the western and northern portions of the Arctic archipelago. However, we have recently received some tidal information from the Russian hydrographic office, with the promise of more, which will pertain to regions where no knowledge of the tides has heretofore been available.

The results obtained from Commander Peary's records show that the tides along the northern coasts of Grant Land and Greenland are quite different in many respects from what had been heretofore supposed. For example, his records prove that the tide occurs three hours earlier at Cape Columbia than at Cape Sheridan, and not later, as had been generally assumed.

As already intimated, the full significance of these observations in respect to Arctic geography cannot be seen at this time.

The meteorological records submitted to this office consist of thermograms covering about 180 days, and barograms covering about 260 days.

Respectfully yours,

R. A. HARRIS.

NOTE.—Mr. Harris, whose report is above presented, is the tidal expert of the Coast and Geodetic Survey, to whom the records of Commander Peary had been referred for scrutiny and examination.

The PRESIDENT (before the lecture): It has for long been the dream of Arctic explorers to reach the North Pole. At last that prize has been won by the United States, and we have assembled here to-night to welcome the winners.

The methods by which a traveller can ascertain that he has actually reached this goal are well known, and although this is a technical subject more suitable for discussion in our *Journal*, where it has already been dealt with, than for consideration here, yet one or two observations on this head may perhaps not be out of place. In the first place, as regards astronomical observations at the poles of the Earth, the observer has only to deal with the determination of latitude, which is a simple operation. On the other hand, the weary Arctic traveller in those icy wind-swept regions has peculiar difficulties to contend with in his geographical determinations, especially at a time of year when the sun is always near the horizon, below which it never sinks. In fact in all such work there must always be a certain margin of reasonable and probable error, appropriate to all the circumstances of the case. Indeed, when a traveller asserts that a certain spot is in a certain latitude, what he means is that the true position does not differ from the assigned position by more than this margin of error. Turning now to the hero of the evening, Commander Peary was awarded our Gold Medal twelve years ago, which is a sufficient proof that he is an Arctic traveller of the highest reputation. Then

again, his efforts have been marked by such splendid persistency as to make success appear to be the inevitable result. And, finally, an exceptionally capable committee of his fellow-countrymen, appointed by the National Geographic Society of Washington, have examined his original records, and have emphatically endorsed his claim. This judicial task could not have been more appropriately placed. It is on these grounds that I stand here to-night as the representative of the Royal Geographical Society, and, armed with the full authority of its Council, to welcome you, Commander Peary, as the first and only human being who has ever led a party of his fellow-creatures to a pole of the Earth.

We are, however, to-night not alone concerned with this aspect of Arctic exploration; for in the course of the many arduous journeys, full of dangers and difficulties, which explorers have made when dragged northwards by the loadstone of the pole, a large amount of scientific work has been done, and our geographical knowledge has been greatly increased. Commander Peary's expeditions form no exception to this honourable record. And this should not be forgotten, because, as I said when I addressed you here in June last, it has been the policy of our Society not to honour any mere race to the Pole. Nevertheless, on that occasion we were here all openly rejoicing at the fact that it was one of our own countrymen who had then made the nearest approach to a pole of the Earth. To-night we have assembled to do honour in the same spirit, and quite as enthusiastically, to an American citizen, who has at last actually accomplished this feat, the dream of all previous Arctic and Antarctic explorers. I will now ask Commander Peary to describe the journey in which he obtained, after more than twenty years' striving, his final victory over the forces of nature.

Admiral Sir George Nares in proposing a vote of thanks, said: As one who has conducted his ship, the *Alert*, through the ice of Robeson channel, to the north end of which Commander Peary and his able second in command, Captain Robert Bartlett, have on *two* occasions conveyed the American ship *Roosevelt*, I have been asked to say a few words of thanks and congratulation to Commander Peary at having at last completed his life's task of reaching the North Pole.

As one who knows the courageous resources necessary in those who navigate Robeson channel, owing to the raging tides and winds that guide the ice-floes there, which never give them an opportunity of resting, the skilful seamanship that is necessary to push a ship through that ice-encumbered channel, I am glad to congratulate Commander Peary and Captain Bartlett at their having, with the *Roosevelt*, reached so high a latitude. On Commander Peary the responsibility of his many journeys was dependent, and with the assistance of his followers most admirably did he carry them out. On his last expedition to the Pole he started from Cape Columbia—the most northern point of the American archipelago.

He and his Eskimo hunters have successfully demonstrated that the Arctic natural life of the country, musk-oxen and reindeer, as found by the Norwegian Captain Sverdrup, have superseded, or at least must be added to, the former Arctic ration of pemmican and preserved meat.

In our former days, in 1852, when looking for Sir John Franklin, I well remember, when crossing Melville island, under Lieut. Meecham, we sighted a large herd of reindeer, that had been herded together by a pack of wolves, but, owing to our confidence in our well-packed Arctic rations of pemmican and preserved meats, we left the deer alone. Had such a case occurred to Peary he would certainly have based his provisions on the deer, as he did in later days when his hunters shot so many near the United States range of mountains in Grant Land.

In criticism of Commander Peary's character as displayed as a traveller in his numerous journeys northward, I would draw attention to the good points—inbred in

his life—which must have reproduced itself largely amongst the Eskimo, the trusting confidence displayed by his followers, as exemplified by Captain Bartlett and his Eskimo and his dogs; his good choice of the best road to follow and persistently following it; his disregard of his own health and spirits—as shown by the lost limbs he has left behind him in his Polar travels, when he never gave up, whatever happened to himself.

I need scarcely dwell on his natural feelings of exultation at attaining the Pole, the journey to which he had consecrated his life, and his great luck then in having fine weather and good ice after his many troubles on former occasions; the extreme distances he than travelled were measured by long hours and short rests. The painful snow-blindness he must have undergone; the troublesome water-cracks he necessarily encountered; and his misfortune with his deep sounding, can only be dwelt on as bad luck. In fact, whoever wants to read an exciting traveller's story, where life is ever being risked, let him read the story of Commander Peary's attempts to reach the Pole.

In seconding the vote of thanks, Admiral Sir LEWIS BEAUMONT said: I owe the privilege of seconding the vote of thanks to Commander Peary to the position I have the honour to hold in the Geographical Society, but, personally, I feel that I have a second title in the fact that Commander Peary's first great journey of Arctic discovery commenced at the farthest point which I had seen in one of the deep fiords of North Greenland. His going over the ground which I had been the first to see and map enlisted my interest and sympathy in his work, and to this interest and sympathy years have gradually added wonder and admiration at the extraordinary courage, patience, and perseverance with which he has continued to fight single-handed against the immense difficulties of the task which he had set for himself.

You have heard from him how the splendid success which has at last crowned his efforts was only won by a combination of twenty years' experience, and the long and patient training of the Eskimo to do his will; but I would like to remind you that in the first great journey to which I have just alluded he had with him only one European and no Eskimo, and that the fame of this his apprenticeship in Arctic sledging has only receded from view because of his more brilliant later achievements.

Commander Peary began by showing that he had in him all the personal qualities which enable a man to make great sledge journeys in the Polar regions—in his fifteen years' work since he has shown that he also possesses the much higher qualities of rapid organization and good generalship.

Under his leadership the zeal and enthusiasm of beginners have been made to accomplish the work of veterans—all the energy that has come within the sphere of his influence has been made to converge upon one object; and while he has remained the brain, guide, and commander, the work done by his assistants has been full of independent initiative and intelligence.

There are some thoughtful people who doubt the value of reaching the Pole, and say, what is the good of it? That question is not for our discussion to-night, for what we have before us is a fact; but in any case what I am certain of, and in a long career always have maintained, is that no genuine honest work, which calls for courage, endurance, and self-sacrifice, such as he has shown, is ever lost. The good of it may not appear at the time or during the man's life, or even in his generation, but it is bound in the end to bear fruit, and to find its use in the world to the benefit of those who come after him. I beg to second the vote of thanks.

Captain R. F. SCOTT: I esteem it a great privilege to have been asked to support this motion. It has been most fittingly proposed and seconded by those British

explorers who have gained their laurels in the regions in which Commander Peary has achieved his great triumph. It is well that those who are most competent to judge should record their enthusiastic admiration of the unconquerable spirit with which Commander Peary has pursued his object, and their appreciation of the justice of the reward which has at length crowned his efforts.

Commander Peary has most generously acknowledged the debt which he owes to the splendid efforts of our British pioneers, and rather than to praise his exploits, it is for me to acknowledge the debt which explorers of the future will owe to him.

The history of the conquest of the North Polar regions extends over many centuries, whilst the history of the South Polar continent has occupied little more than a decade. That the secrets of the South should have been revealed with such comparative rapidity is due solely to the fact that the Southern traveller has benefited by the hard-gained experience of his Northern *confrère*.

Speaking as a Southern traveller, and one who hopes to extend his experience of Antarctic conditions, I have to thank Commander Peary for the great lessons which he has taught us, and for that brilliant example of courage and perseverance which he has set, and which it must ever be the desire of future explorers to emulate.

After the vote of thanks, the PRESIDENT, presenting the medals, said: On the very day on which we heard of Commander Peary's safe return, I sent to him a telegram of warmest congratulation in the name of this Society. To-night I should like to send in your name, and through the channel of the Press, a message to the people of the United States, to tell them that we hold that they may well be proud to claim Commander Peary as a fellow-citizen; for he has taught the world a great lesson. What he has done must encourage every young man to feel that, however difficult the task he has set himself to do, he may hope to win in the end, provided—it is a big proviso—that he is determined to consecrate to it the undivided energy of body and mind, and never to swerve from the narrow path till nature forbids further efforts. This example of success, crowning such a long-continued struggle, will endure as a beneficial influence for years to come, and in other fields besides that of Arctic discovery.

It must be known to you all that our Society has awarded Commander Peary a special Gold Medal, not solely for this last journey of his in which he reached the Pole, but also for all the long years of toil and trouble which he has devoted to Polar exploration. I wish myself to say no more to-night. But I ask you all, when I hand this medal to its owner, to show that you fully endorse its award, that you carry by acclamation the vote of thanks which has been proposed, and that you join in the message of congratulation which we hope may be transmitted to his fellow-countrymen in America.

When presenting the medal to Captain Bartlett, the PRESIDENT said: I am glad that this message of congratulation to the United States has been so cordially endorsed, because it enables me to add, without any fear of misunderstanding, that we in this country may also take a certain national pride in this expedition. In Arctic exploration a system of supporting parties is generally essential; and in Captain Bartlett, the leader of the last supporting party, the leader whose assistance has been so generously acknowledged by his chief, we have one whom we are all proud to claim as a citizen of the British Empire. It is pleasant thus to couple the names of Commander Peary and Captain Bartlett; for, as to Commander Peary, no one is more pleased than he is by any recognition of the merits of those who served under him. And as to Captain Bartlett, I know that he both respects and esteems the leader he has so well served. I hold in my hand a silver replica of the medal awarded to your leader, Captain Bartlett, and this I am glad to present to you in

the name of the Society, and with the warmest congratulations of all present for your fine achievement.

Commander R. E. PEARY: From the bottom of my heart I thank your veteran Arctic explorers for their friendly words. I thank you, Mr. President, for your explicit and unequivocal remarks. Through you I wish to thank the Council and the members of the Royal Geographical Society of London for this magnificent trophy, which I and mine will always prize. The accomplishment of this work which I have tried to tell you of to-night, was done because it had to be done, but this helps to make up for those days in the North—the bluest days of all,—when we had to turn back on previous expeditions, unsuccessful; it helps to make up for those years of exile from home and all that goes to make life agreeable. In this magnificent trophy is the cap, the climax, the finish of four hundred years of history, of which Great Britain has written three-quarters or more. In the person of Bartlett, your flag stands next to the North Pole. In the person of Scott, God willing, it shall stand at the South Pole. Honours are equal—we are of one blood. I thank you.

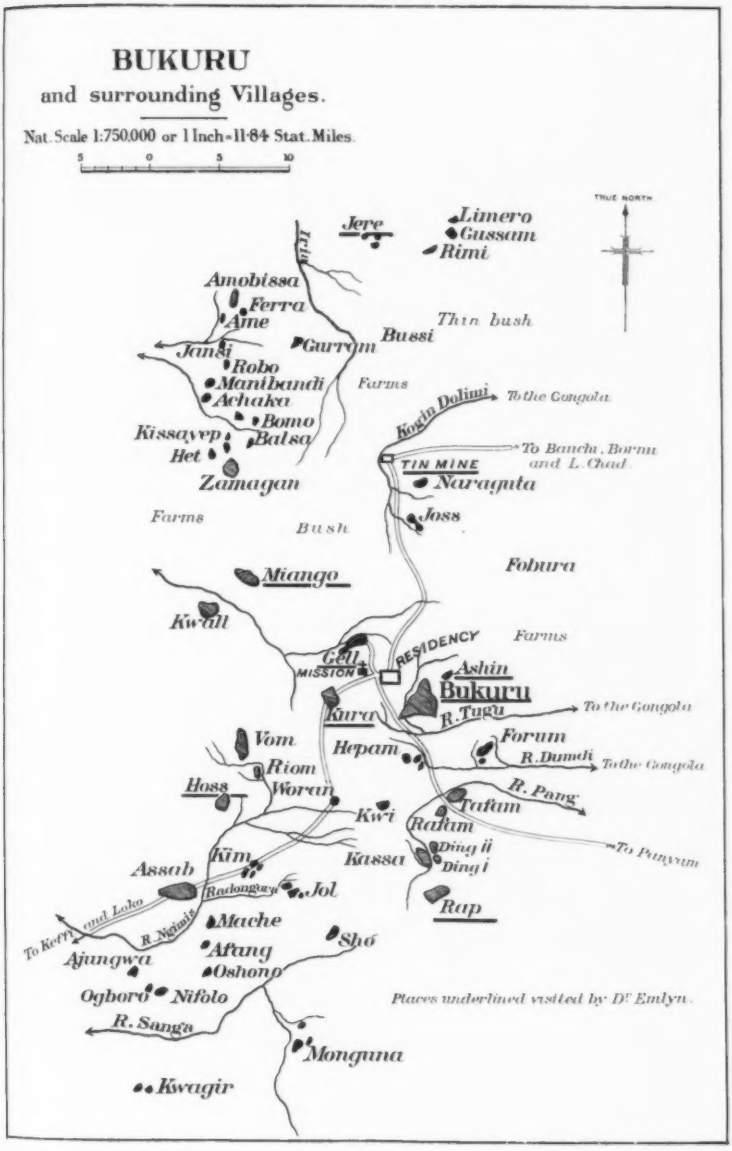
Captain R. A. BARTLETT: I sincerely and honestly, on behalf of my country, the oldest British colony, Terra Nova, thank you for presenting me with this Silver Medal. America has given us Newfoundlanders a chance to do some work in the Arctic; beginning in '69 with Hayes, and then '72 with the rescue of the *Polaris*, then Greely, and then Commander Peary has given us further chances. I am no orator; I wish I were. You will understand I appreciate it, and words at this moment refuse to frame themselves adequately enough for me to express my deepest and sincerest thanks. Fellow-Britons! why did your men do so much in Africa, in India, and in other places on the globe? Because they had men like Kitchener, Roberts, and Wolseley, and others to lead them. We had a man who could lead us, and our task was the North Pole, which must be attained; Stars and Stripes must be planted there. "Now, boys, do it!" That was our tocsin.

FROM HAUSALAND TO EGYPT, THROUGH THE SUDAN.*

By Dr. KARL KUMM.

WITHOUT going into details, I beg to be permitted to state that my journey from Hausaland to Egypt could not have met with the success it obtained, without the support and assistance of the Governments of Great Britain, Germany, and France. Obstacles one had anticipated were removed as one approached them, and difficulties disappeared. The first half of my journey led through comparatively well-known country, the Niger Territories, and the Middle Shari region. When I left Liverpool on October 10, 1908, on the Elder Dempster boat *Falaba*, my main object was to visit the Mission Stations of the Sudan United Mission, and to establish the Lucy Memorial Freed Slaves' Home at Rumasha, in Northern Nigeria. This led me first to the Government centre in Zungeru, and afterwards by way of Lokoja to the various Mission Stations. During this journey of inspection when travelling through the Murchison range from Bukuru

* Royal Geographical Society, April 11, 1910. Map, p. 248.


BUKURU
and surrounding Villages.
Nat. Scale 1:750,000 or 1 Inch = 11·84 Stat. Miles.
5 0 5 10
TRUE NORTH
Jere
Limero
Gussam
Rimi
Amobissa
Ferra
Ame
Thin bush
Bussi
Janki
Gurrum
Robo
Manibandi
Achaka
Farms
Bomo
Balsa
Kissayep
Het
Zamagan
Kogin Dolimi
To the Congola
To Bancha, Borm and L. Chad
TIN MINE
Naraguta
Farms
Bush
Joss
Fobura
Miango
Kwall
RESIDENCY
Farms
Gell
MISSION
Ashin
Bukuru
R. Tugu
To the Congola
Kura
Vom
Hepam
Forum
R. Dumdi
To the Congola
Riom
Hoss
Worau
R. Pang
Kwi
Tafam
Rafam
To Panyam
Kim
Kassa
Ding ii
Ding i
Assah
Radonguy
Jol
Rap
To Kerri and Lako
R. Ngwis
Mache
Sho
Afang
Ajungwa
Oshono
Ogboro
Nifolo
Places underlined visited by Dr Emlyn.
R. Sanga
Monguna
Kwagir

to Langtang, I traversed a little-known district in the southern parts of the Bauchi highlands. The whole of this plateau land is cultivated, and though the millet and guinea-corn does not grow to any height, and does not bear well, yet the harvest usually gives the people a sufficiency of food. Large numbers of villages are spread all over the highlands. They are either situated on or at the foot of some rocky eminence.

Within 25 miles of Bukuru live no less than 120,000 people. The whole country has been deforested by them, and there is hardly a tree to be seen. The natives ride their mountain ponies barebacked, and as they themselves wear no clothing with the exception of a weird loin-cloth, they find it somewhat difficult to maintain their seats. They therefore scratch the backs of their animals until the blood exudes, and thus glue themselves on to their beasts. The agility of these animals is very remarkable. I saw men riding down what seemed to me precipices where it would have been absolutely impossible for me to have attempted a descent. The ponies are well-trained, and follow their master's call like dogs.

From Tafam, we continued our march through a pass between two hills, and then out on to the undulating plain beyond. A number of natives whom we met at four o'clock coming back from their farms, when they saw us, darted like deer into the grass, ran in long leaps in a half-circle around us, and escaped towards their homes amongst the hills.

On December 26 we crossed several large brooks running towards the north-east, and our horses found difficulty in climbing over the rocky ground. In a beautifully sheltered nook, amongst large magnificent rocks, with a clear stream flowing half round it, I found the newly established Mission Station of the Church Missionary Society, Panyam. The descent from the mountains during the next few days was connected with considerable difficulties. Immediately beyond Panchim we entered a rocky gorge, and climbed up and down steep stony terraces, which in some places looked like staircases, without a path or even a trail. We were led by natives, whom we had persuaded to take us to Wokos, a Government post. The view from the platform on which I camped was magnificent. The country lay spread out at one's feet for some 50 or 60 miles, and from an elevation of 4200 feet above sea-level one looked down some 3000 feet into the low foothills of the Murchison range. The feats of climbing accomplished by our horses, who scrambled down staircases of stone steps 4 to 5 feet in height and only some 6 inches in width, were astonishing.

Passing through the Yergum tribe we arrived at Langtang, a Mission Station of the Sudan United Mission. The Yergum people live in small hamlets spread about promiscuously over the country side. These hamlets usually consist of half a dozen huts belonging to one family. From the top of the Langtang Juju hill, some forty or fifty of these hamlets can be traced hidden away amongst the guinea-corn fields. The whole Yergum region would probably form an excellent cotton country, for the cotton grown at the Mission Station of Langtang is of a very good quality. If

N'GELL STATION, ONE OF THE POSTS IN BAUCHI.

DUGOUT ON THE SHARI.

SULTAN SINUSSI OF NDELE.

BEAK-FACED WOMAN OF SARA-KABBA TRIBE.

wants could be created among the natives that would lead them to work, the labour difficulty would be overcome.

On March 13, 1909, I arrived at Yola, the last British post in the Niger Territories, and continued on March 17 my journey towards Garua in German Adamawa, where I arrived on March 31. My cavaran at this time consisted of seventy people. The road from Garua to the Logone is well made. Kilometre stones painted white with black figures on them mark the distances along the splendid highway. The road is about 30 feet wide and graded, and runs from the coast to Garua, and from Garua to the Logone, with a regular boat service down the Logone to Kusseri. I left the main road at Gidar, a Fulani town some 60 miles from Garua, and traversed the country of the Lam pagans. Like most other pagans in the Central Sudan, their villages are situated at the foot of little rocky hills. The compounds of the villages, or districts, are not built together, but placed here and there among the rocks. The chief of the Lam tribe gave me the names of seventeen districts under his control.

Marua, which is to-day the largest city in Adamawa, is too well known to need any description. On April 6 I left Marua to traverse the Musgun territory towards Manjafa on the Shari river. For the first two days I passed through a number of Fulani villages. Large numbers of sheep, goats, and cattle were grazing on both sides of the path, and flocks of white guinea-fowl looked very curious as they fluttered away.

Chabawol, a Fulani town, consists of a number of scattered compounds, and I found it difficult to house the men. My caravan had grown to a hundred people. The Marua river accompanied us up to this point. The next town was Gilbidi. The chief of the place with a considerable number of horsemen came out to meet us. He had cleared and cleaned out his own large compound to welcome the white men. Between the Fulani country and this first Musgun centre, there are 9 miles of acacia bush. The Musgun houses are curious fort-like structures. They consist of five or six round huts built of mud close together, usually in a circle. Each hut is connected with the other, and only the first and last have a door that leads into the open. Both walls and roofs of these buildings are made of mud, out of which regular ornamental protuberances rise, which are used as ladders in the construction of the building. The houses are up to 20 feet in height.

The Musgun country is absolutely flat. The natives draw their water out of wells some of them 30 or more feet in depth. On April 10, we saw Musgun hamlets around us in every direction. At mid-day we reached the banks of the Logone opposite the town of Musgun. An island forms a stepping-stone to the other side. The depths of the water of the western branch of the river we found to be 2½ feet, and its width 150 yards. The eastern branch of about the same width was 5 feet in depth at its shallowest place. A number of small dugouts, which carried two men and two

loads each, soon ferried us across. The Musgun are magnificent specimens of humanity, but their women are exceedingly ugly. The upper and lower lips of their wives are pierced, and have large discs of tin, looking-glasses, or Maria Theresa dollars inserted in them.

At Fort Archambault, on the upper Shari, I was detained for two months, at first in waiting for the waters of the Bahr-Auk to rise, as I intended to follow it to its source, and then, when the waters of this river did not rise rapidly enough for me to navigate it, in purchasing oxen and horses for my trek towards the Nile. On July 11 at 6 a.m. I left Fort Archambault, and crossed the Shari with about 150 people, 25 oxen and 4 horses. Half a mile from the river-bank, the rain on the previous day had created another river, breast-deep, and continual rain day after day did not improve our going. I only intended to go 6 miles the first day, as this was my first experience with pack-oxen. I reached the Kirdi village Sello, in the midst of a drenching rain, at 1.30 p.m. The Kirdi people form a large tribe and are divided into a number of sub-clans, amongst whom the Sara Kabba are probably the least civilized. These Sara Kabba, living on both banks of the Bahr-Auk and Bahr-Salamat, are good agriculturists, but have been much harassed by Mohammedan slave-raiders. They have disfigured their women in order (as one of their chiefs explained to me) that they may exercise no attraction over their Mohammedan enemies.

Several agricultural implements which I found amongst these people are worth describing. The first is a short 1½-foot long-handled spade with a wooden handle and an iron shovel. The natives kneel on the ground while using this spade. It is the tool for weeding. The second, a small shovel 4 inches in diameter, with a handle some 7 feet long, is used to dig shallow holes for the planting of guinea-corn, maize, and millet. One man digs the hole, the other sows the seed and treads the earth down. The third tool is more complicated. It is also a shovel, but with a very long blade, only the end of which is strengthened with iron. The wooden part is perforated, and has two long cuts running the whole length so as to let some of the earth pass through. This third implement is used by men and women alike to dig the trenches between the rows of guinea-corn. It is worked kneeling. I suppose one might describe it as a sort of primitive hand-plough.

Nineteen days' heavy marching brought me and my caravan to Ndele, the capital of the much-feared and maligned Mohammedan chief Sinussi, who rules over a country, roughly speaking, as large as France. Ndele, in an altitude of 1550 feet, is a town of 8000 or 10,000 people. The houses are scattered through several small valleys, some hidden among the rocks, some on the slopes, some on the hilltops. The four important compounds at Ndele are, the French residency on Government Hill, a trading station of a French trading company, the large walled-in compound of the Sultan, and the smaller one of his son.

On Sunday, July 31, Sinussi, with a large number of his followers, came to call on me. He is still a very active man, about fifty-five years old, and seems to be implicitly obeyed by his people. On Saturday, August 5, I paid him a return visit. Sinussi is a rich man for an African. Quite a number of magnificent Persian rugs covered the floors and the chairs. He himself was installed in an iron rocking-chair. The rich wild smell of sandalwood and Oriental scents was somewhat overpowering. On the advice of Sinussi I changed my route, and instead of going by way of Duwar and Min-Andal, I went *viâ* Wadda and Katwaka. The chief of Wadda is Sinussi's brother. Sinussi insisted that the other road was impracticable on account of the swollen rivers.

Kano. Yergum. Angass.

CHARACTERISTIC HAIR DRESSES.

Haussa or Adamawa. Fulani. Bornu or Bagirmi.

SPECIMENS OF FACE TYPES.

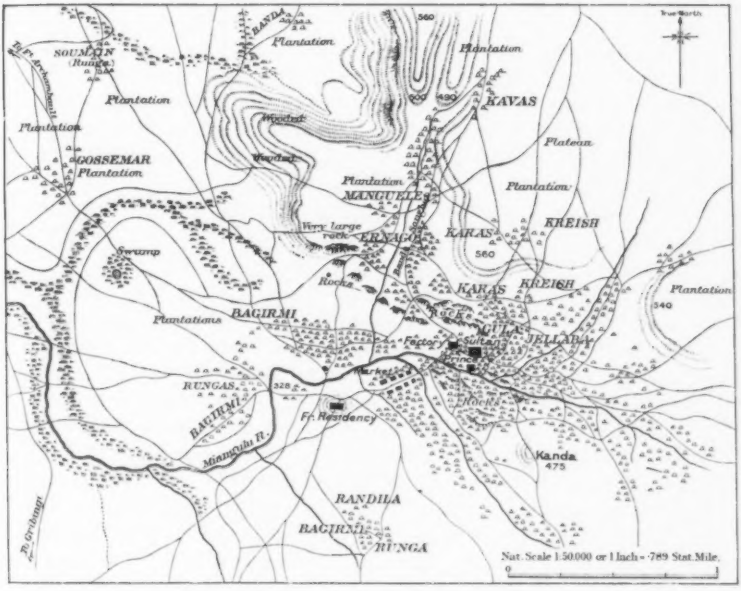
On Monday, August 9, my caravan got under way again. The remnants of my oxen I left in charge of the non-commissioned officer belonging to Lieut. Raymond's party, who remained behind with a guard at Ndele. The Sultan and all his people were out to say farewell. My following had assumed considerable proportions. Like a large snake, about a mile long, it wound its way from the Residency down into the valley below, and up through the town of Ndele towards the Sultan's palace. Lieut. Raymond and twenty of his guards were with me. These guards are

levies of the Shari Chad Protectorate, while the Tiraillieurs are Senegalese sharpshooters. The latter are exceedingly good fighting men, who have been brought from the French Western Sudan by way of the Congo and Shari to this territory. There were also some twenty or thirty carriers and camp followers with the lieutenant. A French trader with twenty carriers had also joined us, and there were my carriers and people, the Mekka pilgrims, and a guard of Sinussi's men of some half a dozen armed with rifles. Twenty others had gone ahead three days before to prepare our camping grounds as far as the village of Wadda, making in all some 250 people.

The ascent of the bush plateau from the town was difficult, boulders and brooks giving a great deal of trouble to our horses. The road lay east-south-east. At a quarter to eleven we called the first halt in an open glade, where in the rocky depressions a good deal of clean water had accumulated, and later on we three white men rode forward. Our good trader told us he had gone by way of Wadda to the Congo before, and therefore knew the path. He promised to take us to the first village in two hours. After two hours we found ourselves lost in the bush on the road to the Congo. Just after leaving the place where we had rested, I noticed a path branching off to the left, and called the attention of some of my men to it, but our good merchant seemed so sure of himself that we followed him. The bush track was a new one that had evidently been used by some fifty or a hundred people the previous day. Unfortunately, these people were not our vanguard, but a party of elephant hunters who had gone southward to kill game. At three o'clock we came to a considerable number of bush shelters where people had camped the previous night. Quite a number of fires were still burning, and immediately afterwards we came upon the last of the elephant hunters, who told us that we had gone out of our way, and had passed the village. I impressed one of them as a guide, and turned back. A thunderstorm was threatening, and at half-past three it came down in torrents just when we had the first huts of the small slave village in sight. The inhabitants of Sinussi's villages are practically all slaves, captured north, south, east, and west of his territory, where Sinussi has destroyed all the villages and surrounded himself with a cordon of uninhabited bush some 100 or 200 miles in width. At four o'clock we halted by the side of a little compound of three huts and decided to camp. Nine days of travelling through the uninhabited bush brought us to Wadda. Mohammedu, its chief, had come to welcome us on our arrival, mounted on that great treasure of any important African chief, a very fat horse. He was clothed in a large blue woollen gown, and introduced us to his little army of some fifty men drawn up in front of his house in open square. The men were armed with rifles, but very few of them of modern pattern. While Lieut. Raymond camped in front of the chief's palace, I went out to the little French trading post just outside the village. Wadda has about a thousand inhabitants, and is built on the banks

of the Pepi river, flowing north-north-east to south-south-west. Large sandstone boulders with frequent caves among them close in the river, which at this time was some 30 yards wide, and 3 feet deep. The altitude of Wadda is a little over 2000 feet above sea-level. The people grow guinea-corn, maize, wheat, sweet potatoes, manioc, etc. They have horses and donkeys, cattle, sheep, ducks, chickens and pigeons, and seem, in fact, well supplied with everything. The exports from the country consist of ivory and rubber. Ivory is the most valuable asset of those

NDELE
the Capital of
SINUSSI.



far-off regions at the present moment, and will probably remain so for a number of years to come, as the herds of elephants inhabiting the otherwise uninhabited bush are numerous, and their tusks exceptionally large. Two tusks which I saw in the Shari valley weighed 187 lbs. and 192 lbs. respectively, and were some 9 feet in length.

Sinussi has frequently sent caravans of from a hundred to two hundred people, loaded with ivory, into the Anglo-Egyptian Sudan to exchange ivory for cloth and other European trade goods. All the ivory of this region is the private property of Sinussi, and as the punishment for any smuggling is death, there is very little of it.

We left Wadda on Monday, August 23, with a caravan of about 150

people and six horses. Some twenty or thirty men had been sent on ahead to prepare our way and our camps as far as the Kotto river. The French trader was going from Wadda towards Muka and the Mobangi, while the lieutenant proposed to come with me, and help to open a new road to the Anglo-Egyptian Sudan. We crossed the Pepi torrent, which took about an hour, Mohammedu and all his people accompanying us to the other side, and at 8.30 we began our march eastward. At 9.30 we came to a little brook called Wallakeki, and a village called Bangobale. The ground was rocky and of sandstone formation. At 9.45 we continued through open forest interspersed with glades. During the whole afternoon it rained heavily. We had to wade through a very bad swamp, out of which the lieutenant's horse and himself had to be rescued with some difficulty. The Sinussi chief who accompanied us also measured his length in the reeds. Our vanguard had prepared quite a good road. Next morning, as a result of more or less continual rain all night, we found the ground desperately wet. At 7.30 we passed a swamp and had some difficulty in getting to the other side. An open fadama stretched towards the south-east. We followed it for a while, and then turned north-east into the bush.

At 8 o'clock we crossed a brook running north to south, falling in cascades over sandstone boulders. For a little while we continued south-east amongst wild rock formations. Afterwards the bush became a dense jungle, with multitudes of elephant paths. Our own blazed trail was almost unrecognizable, but the 150 people with us made a difference. At 9.45 we reached the "Raymond" rock, a mighty sandstone boulder some 400 feet high and covering two acres. Here we rested half an hour, and continued at 10.15. The descent from this rock was difficult for our horses. Later we crossed a little brook, and then passed through bamboo jungle. Five days' journeyings like this, and on Saturday, August 28, we came to the Mera rock, at a place where there was formerly a large village. One of our guides, a slave of Sinussi's, pointed out the place where his hut had stood, and the place where his father had lived, who was killed in the slave raid. In the early afternoon we crossed some half a dozen small brooks and swamps, all the water running north-east into the Kotto. At 3.40 we heard the Kotto river, and at 3.50 we camped on its banks, where our vanguard had just began to prepare the huts. Opposite to our camp lay "Patience island," and in front of my tent some eight or ten elephant high-roads converged on a ford, which was evidently the crossing-place of the animals. There was no rain that day or the next. The hydrography of this country will have to be somewhat altered, as the source of the Kotto river lies very much further north than was previously supposed.

Five days we spent in bridging the river, and on the morning of the sixth day we were across and set out eastward again. Continual rainfall had not improved our going. Slowly our poor animals toiled onwards, climbing in and out of elephant holes full of water; at first we had some

sort of elephant path, but later on we pushed our way through the unknown bush, over rocky hills and mountains, and through swollen streams.

Let me give a few notes as I jotted them down at the time. *Friday, September* 3.—Rise at 6 a.m. Rain still falling. Leave 6.30. The ground is terribly swampy. Several small brooks have become racing streams. After having passed through a swamp that has taken all the karifi (iron)—the Hausa expression for strength—out of my horse, my horse goes down with me in a stream. I get off with a sound soaking. Think of changing, when the rain commences again. May as well go on in my wet things. Wading through several small rivers, all of them running west into the Kotto, I walk on till 11 o'clock. The country is very hilly. Hills 1000 feet to 1500 feet high. It rains all day. Rest in the rain, from 11 to 12.30. Continue uphill and downhill till 1.30. Rain stops for a few minutes, and we form camp. No sun; no glimpse of the blue sky all day. Rain during the night. Thank God we are across the Kotto.

Thus day follows day. I had sent five men ahead in the direction of Katwaka and Keffi Genji to purchase food and come back on their own trail, which we intended to follow. I had given them compass directions and instructions. On the second day after leaving the Kotto, we ascended through hilly country to a plateau land, out of which single hills, between 1000 and 2000 feet in height, rise at frequent intervals. The height of these hills is probably some 3000 or 4000 feet above sea-level. The ground was covered with bush, and here and there were thick jungle, high grass, and stretches of bamboo forest. Traces of elephants, buffaloes, and lions, crossed our track repeatedly. The entry that repeats itself in my diary almost every day is the following: "Rain all day, and—no food——"

On the plateau rocks appeared from time to time, and a good deal of metal-bearing quartz showed underfoot. The higher hills and mountains lay to the north of us. We were now crossing the watershed between the Shari Congo and Nile systems. We had aimed for a town called Katwaka, marked on the maps in very large type. We found the site and the ruins of some huts, but no people. On our arrival I sent out two search parties to look for traces of human beings up and down the Katwaka river. They were away for three hours, and came back without having seen any traces. It was now several weeks since we had seen a human being not belonging to our caravan. The next day at 3 p.m. we came upon the first natives of the Anglo-Egyptian Sudan, a party of twelve hunters belonging to Malagere, a village some 35 miles south-west of Keffi Genji.

The geological formations between Ndele and Keffi Genji are part of the Central African ironstone plateau. Along the river-banks sandstone appears from time to time, and on the watershed between the Kotto and the Bahr-el-Arab, granite, greenstone, and quartz, the latter holding considerable and probably workable deposits of copper. Traces of gold were found on one of the tributaries of the upper Benue in Adamawa, on the border of the French and German territory.

The movement which has had and will have a permanent influence on the sociological conditions of the Sudan is the Mekka pilgrimage of the Moslems. The usual route taken by such pilgrims from the Central and the West Central Sudan is through the great cities of Northern Nigeria, Sokoto, Kano, Bauchi, Kuka on Lake Chad, and then by way of Dikoa and Kusseri through Wadai, Darfur and Kordofan to Khartum. During the various wars in the Sudan this route has been changed at different times. When Rabba was Sultan of Dikoa, all the caravans passed through his capital, but since Germany has taken possession of Adamawa, and is exacting a toll from the caravans, the pilgrims go round the north end of the lake, that is to say, through French territory, and make their way through Kanem up the Shari valley to Fort Archambault, and thence through the Shari-Chad Protectorate to Keffi Genji. During the whole length of this route one finds every 20 or 30 kilometres apart a pilgrim camp consisting of from ten to thirty huts built of grass. The latter half of this route, from Ndele to Keffi Genji, is impracticable in the rainy season, as some eight or ten mountain torrents block the road. These cannot be forded, and there are no bridges or boats. By going through Wadda I opened a new route for the traders and the pilgrims, which will probably in the future take the place of the old northern road, as it is shorter, and has only the Kotto river to deal with. The trees I had thrown into the river should enable any caravan to build a permanent bridge now within 24 hours. Men, without women and children, can go across with little difficulty.

At Keffi Genji the pilgrim route goes to the north-east by way of Kabbaluzum, Bahr-el-Arab, Majabera, Lideja, Nuhud, El-Obeid, to Omdurman. And from Omdurman the road continues by way of Berber and Suakim to Jedda, and thence to Mekka. A caravan leaving Timbuktu in the Western Sudan would probably be a year to a year and a half on the road. They usually start out, especially if a caravan is under the leadership of an important chief or the son of a chief, with a large number of cattle, horses, donkeys, sheep, goats, etc. There are also a considerable number of old men, women, and children in such a caravan. Practically all these drop out on the road. They die or are sold. The boys and young women are slaves which are taken as easily transported coinage to Mekka, where they are turned into ready money.

The caravan which accompanied me, while suffering continually, only lost one of their old men. They had been very poor when they joined me at Fort Archambault, and I think on the whole they were better off when they left me at Keffi Genji than they were before. Another caravan which was just ahead of me was led by the eldest son of the Sultan of Timbuctoo, a young man of about thirty-two years of age, who had studied in the Moslem University at Fez in Morocco, and at Keirouan in Tunis. I had met him twice at Busso, and at Fort Archambault on the Shari. We had exchanged presents, and he had become exceptionally friendly.

Altogether he was one of the most intelligent men I have met on this journey across Africa. When he left the Shari he had with him some 500 head of cattle, 50 donkeys, 15 horses, and 150 people; and when I saw him again at Keffi Genji (he had taken the northern route through the mountains) he was in a starving condition. He had lost two-thirds of his people on the road, all his cattle, all his donkeys, and, I think, had one horse left, and found himself in a pitiable plight. As all my oxen and horses had gone too, I could do little for him. I wished him to come with me to Wau, the capital of the Bahr-el-Ghazal province, but he wanted to press on towards Omdurman, following the old road. One met these caravans with their women and children trekking towards their promised land in large numbers, but I have only seen them come back in ones and twos; wiry, lean, shy-eyed men of thirty-five. The others remained on the road or have disappeared in Mekka. The religious enthusiasm—and fanaticism—with which many of the pilgrims are imbued, demand and secure the respect and the admiration of the pagans, who are thus attracted to the Crescent Faith.

The PRESIDENT (before the paper): Dr. Kumm, our lecturer to-night, is a Doctor of Philosophy at Freiburg University. He has made a speciality in his studies of geography, including surveying; of Oriental languages and of astronomy, and he has also worked for some time at both the Heidelberg and the Zeiss observatories. During the last few years he has been occupied in the Sudan, mostly in missionary work. It is therefore obvious that he is well qualified for the work of a traveller. The expedition which he is going to describe to us to-night is one in which he traversed Africa from one coast to the other. His main object, from the geographical point of view—not from all points of view—was to determine the line of demarcation between the lands occupied by Mohammedanism and the lands occupied by pagans. No doubt the country traversed by Dr. Kumm is almost entirely under European dominion, but about a great deal of it we know very little, and we may expect to hear a good deal of new and interesting information.

The PRESIDENT (after the paper): I am quite sure that I may, in the name of everybody here present, express our keen appreciation and our thanks for the admirable lecture we have listened to to-night.

ON THE BORDER OF THE GREAT DESERT: A JOURNEY IN OMAN.*

By Lieut.-Colonel S. B. MILES.

TOWARDS the close of the year 1885 the tranquillity prevailing throughout the dominions of the Sultan of Maskat, who had wisely taken advantage of the prestige that had accrued to him after the discomfiture

* Map, p. 248. Although the journey described here was made a quarter of a century ago, it is fifty years later than that of Wellsted, and is really an important addition to our knowledge of a little-known part of Arabia, including the mysterious Great Desert.—ED. *G.J.*

of his enemies in 1883, to consolidate his power in all quarters, gave me the opportunity I had long wished for to make a somewhat extended tour through the provinces of Oman and Al Dhahireh in order to visit certain localities and districts which circumstances had not previously allowed me the gratification of exploring, and with a view to extend my personal intercourse with shaikhs and other personages in those regions with whom I had not hitherto been able to become acquainted.

On my signifying the Sultan with my wishes, His Highness was good enough to assist me in sketching out the tour and in promoting my views in every way. He was kind enough to appoint Seyyid Hamood bin Nasir, son of the Wali of Muttrah, as my companion and introducer. He also directed the shaikh of the Beni Kelban tribe, Nasir bin Mohammed, to accompany me throughout as guide and as kefeer on behalf of the Ghafiris.

On December 11 I proceeded by boat to Muttrah, where my followers and the camels were assembled, and there distributed the baggage for the escort into six light loads for as many camels, in order that we might travel expeditiously whenever convenient and desirable to do so. The riding-camels for the party were selected with regard to their fitness to perform the whole journey, as it was not intended to change them *en route*, while for my own riding the Sultan kindly chose from his own stud a valuable female dromedary called Samha, which proved one of the swiftest, most easy-paced, and docile animals I ever bestrode.

It was late in the afternoon before we moved out of Muttrah, and as my party was not quite complete I spent the night at Wataia, intending to make a real start the following morning. On December 12, accordingly, we marched from Wataia, and, skirting the hill range over a bare and uninteresting country, halted at Fanjeh, where we camped for the night, and, starting early the next day, arrived at Semail in the forenoon. Here we stayed for a couple of hours to feed the camels during the heat of the day, and then trotted on to Saija, a village belonging to the Beni Jabir tribe, at which place we intended to pass the night.

In the month of March of this year, 1885, a cyclonic storm or hurricane of unprecedented violence had burst over central Oman, causing widespread destruction and misery. It had been followed by a deluge of rain, which had swept down the valleys and poured a devastating flood of water through the villages and settlements, and had done incalculable damage to houses and cultivation, while hundreds of thousands of date trees had perished. Dashed by the cyclone against the precipitous walls of Jebel Akhdar, the clouds had broken and fallen in torrents of rain down the steep gorges and ravines, and had concentrated a mighty wave down the Semail valley, which had carried everything before it. The river is usually but a shallow, babbling stream, rolling down its sandy bed, from which it is drawn

to fertilize and irrigate the productions of nature on the banks, and though the Arabs are accustomed to see occasional floods after heavy rain, there was no record among them of a similar visitation, and I was assured that the oldest inhabitant could remember nothing so calamitous. The tumultuous rush of water had come upon the people so suddenly as to take them completely by surprise, and give them little time for precaution or for removal of portable property.

In the narrows the river had swollen to an extraordinary height, subsiding again as rapidly as it had risen, the marks of its highest point being still visible on the banks. The destructive effects of the terrible tornado that had visited the land nine months before were manifest everywhere, and as we rode up the valley from Fanja we witnessed the wrecked houses, the headless palms, many of which were broken or bent to the ground, the tempest-stripped trunks of trees and ruined gardens; while the poorer natives, whose rude matting and palm-leaf huts had in many cases been swept bodily down the vale with all their belongings, were still bemoaning the calamities and losses.

Saija is picturesquely situated on the left bank of a ravine or gorge, and has about eight hundred inhabitants and some nice houses and gardens. Dwelling in seclusion, in poverty, and in dread of the ruling family, though secure enough, I believe, under the friendly protection of the Beni Jabir, I found here the remnant of a once domineering and masterful race, namely, the Yaareba, whose princes held royal sway, not only in Oman, but also over the entire Indian ocean, which the pirate craft of the Yaareba rulers darkened with their sails, holding it in terrorism against Europeans and natives alike for a century and a half. It was under the rulers of this dynasty that the Portuguese, who had long held possession of Mascat and the coast of Oman, were eventually expelled from that country in 1650, and it was under the same vigorous *régime* that the "Mascat Arabs," as they were called by the East India Company's officials, became so renowned for their naval expeditions and predacious raids, and so formidable against the sea-borne traffic of the Arabian sea.

On arrival at Saija I had despatched a messenger with a note to Shaikh Nasir bin Mohammed of the Beni Rowaiha tribe, who had received me hospitably at Zikki when he was the Wali or Governor there nine years before, asking him to provide me with a kefeer through his territory to that town.

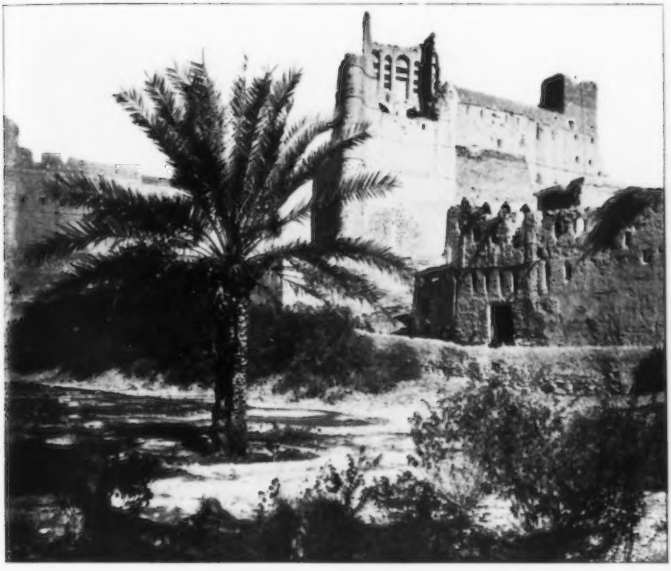
The shaikh's house at Wibal is only 3 miles from Saija, and soon after we had started the next morning we met the courteous old shaikh coming towards us, and our greetings were very cordial and friendly, for I had not forgotten his kindly reception of me, and I was glad to see him again. He pressed me to stay a day at Wibal with him, and if I could have afforded the delay would willingly have done so to please him; but it was not possible, and for the second time I was

obliged to decline the invitation. The shaikh then insisted on becoming our guide himself and accompanying us to Zikki; it was a long ride, and I tried to dissuade him from undergoing the needless exertion and fatigue, but to no purpose, and he came all the way thither.

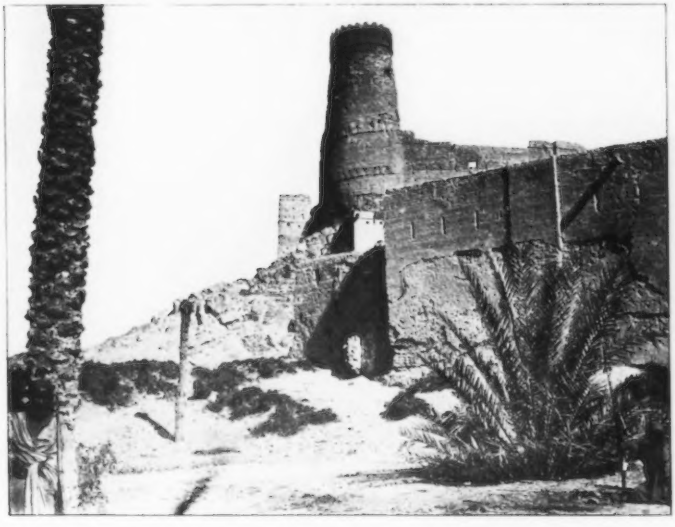
Wibal is in the proximity of a low white hill, which is very conspicuous from the road, being surmounted by a watch-tower and skirted by a dense grove of palms. The Wadi Beni Rowaiha is here very narrow, with high ranges on each side, while the gradient rapidly increases until we get about halfway to Zikki, when we finish our climb up to the top of the valley and arrive at the crest of the great central watershed of Oman, and here we quit the bed of the Wadi Beni Rowaiha, which can no longer afford us a highway, and begin to traverse the Nejd, which has an altitude of 2200 feet.

The Wadi Halfain, of which we see more anon, has its source to our right in the inner recesses of Jebel Akhdar. There is said to be a donkey track from Zikki to Seek up the mountain, but the path is precipitous and perilous. After Nejd Mejberia, where we rested at a small grove and felej, we came to Wadi Mateh and then to Karut. At one part the road is raised 20 feet above the plantations and date groves, through which the torrent dashes along until lost to view among the trees. We seemed to be moving, as it were, amidst the branches of trees, and the change was a pleasant one from the confined vista of arid rocks to the fertile and open country now unfolding in front of us. Passing a strip of level and grassy plain, we enter a shallow watercourse and begin to descend the gentle slope on the western face of the watershed. It was two hours after noon before we reached the fort at Zikki, where the Wali recently appointed by the Sultan, Shaikh Mohammed, received me very cordially, and treated my party hospitably. There had been a change in the political situation here, owing to events that had taken place in the previous year, 1884, when the fort had been evacuated and surrendered to the Sultan under an agreement with the Beni Rowaiha tribe. The new Wali had garrisoned the fort with Beluches.

It became necessary here to change our baggage camels, a procedure which somewhat retarded our departure the following day. It was consequently rather late in the morning when the camels were reported to be ready to start; but I had employed the interval in taking photographs of the Shaikhs and people whom I had assembled in the court-yard. At first the appearance of the camera appeared to create the impression that something uncanny was intended, and it was impossible to get them to stand in front of it. This difficulty, however, was overcome by my own people mixing with the others, and then exposing themselves to the same fancied danger; but I think the good folks at Zikki were much relieved when they saw the object of their dread shut up again in its box and packed away on a camel.



PART OF THE FORT AT BAHILA.



WIND TOWER ON FORT AT BAHILA CALLED BURJ AL RIH.

THE FORT AT JARBRIN.

JEBEL MISHT FROM OUR CAMP IN THE WADY EIN.

Having said farewell to our host, we mounted in front of the fort, and began our day's march by descending the steep bank of the Wadi Halfain, and wading across the stream to the left bank to pick up the track leading to Minha. For some little distance we continued to pass scattered habitations, and from this point looking back the view of the castle and hujrahs of Zikki was imposing and romantic. The road at first runs alongside the Halfain stream, here very shallow, and at 1½ miles we come to Zikkait, a small fortified village of the Beni Riyam, enclosed by a quadrangular wall strengthened by two bastions at opposite angles. We pass to the left of this, and now unrolls before us a broad, slightly undulating plain of light sandy soil, sprinkled with herbage and declining with unbroken horizon to the south and west. The Wadi Halfain, which intersects it, and which was still flowing when we last crossed and left it behind us, reaches the sea at Ghubbet Hashish in time of flood. The encampment to which that zealous and observant traveller, Wellsted, was taken by his Beni Boo Ali friends on December 7, 1835, was situated in this wady, and is known as Ghor. With its tributary the Wadi Kalbuh, the Wadi Halfain forms the highway from Adam to Mahot, and is much traversed, as it is well supplied with pasture and herbage, and is seldom without water. Caravans between Adam and the sea take eight or ten days, and I was given the names of thirty halting-places. The Wadi Halfain debouches at a small creek a short distance to the north-east of Mahot.

After maintaining a fair trot for three hours, we approached the environs of Minha, a large and straggling settlement standing in a rich and well-watered district, and where I was surprised to find there was no wali or shaikh of any consequence, the dispenser of justice and arbiter of disputes being the metowwa and kazi, Mohammed bin Mesood, who is reputed to be the most learned man in Oman. I had not intended to halt at this place for more than an hour or so, being desirous of pushing on at once to Adam, the frontier town of Oman, which had not been visited by Wellsted or any other European traveller. Some delay was, however, occasioned by the information received here that Adam, which like Zikki is occupied by two tribes constantly at feud and warring with each other, was in a disturbed state, a conflict with some loss of life having taken place a few days previously. Occurrences of this kind are but too common in Oman, where the people hold life very cheap, and there was nothing in the affair to hinder my plan of going thither, especially as it seemed probable that my presence might serve to distract the Adamites' attention for a time from their quarrel, and give time for their passions to cool.

As we meant to return to Minha, it was suggested by my Arab companions that a portion of the baggage with some of the escort

should be left behind, to be picked up on our way back, and that we should take the remainder with a few of the Jenebah tribe as kefeers. This was accordingly arranged, and Seyyid Hamood engaged six Jenebah Bedouins to accompany us. The detention involved by this change kept us till nearly sunset, and we then started on again and rode 5 miles to a hamlet called Izz, where we camped for the night, crossing on the way the Wadi Metaiyin, which runs past Birket-el-Muz and joins the Wadi Halfain. Izz is encircled by a protective wall, and the population, which consists of members of various tribes, numbers about 300 souls.

The people were very friendly, but I preferred the open air to their close and stuffy houses, and with the shaikh's permission we took possession of some of the Arish or date-stick huts, of which there were many on the plain a little distance off. These huts are occupied by the Arabs and their families during the sultry summer months, when the heat in the village becomes stifling beyond endurance. They are small and decidedly draughty, but are clean and comfortable. I found it, however, piercingly cold during the night, owing, I suppose, to the extreme radiation from the sandy soil, and the dryness of the atmosphere, and I was glad of all the wraps I could muster. The morning of the 16th we mounted early and advanced in the direction of Adam, which lies almost due south of Minha.

Our road lay over a gradually declining sandy plain, sprinkled with dwarfish acacias, brushwood, and desert herbage, and as we had some distance to go we pushed our dromedaries along at a good pace. The cool breath of the morning was delicious, and as we sped along, the desert air, and the consciousness of being on the edge of the great wilderness, with a boundless expanse of open country unrolling gradually in front of us, caused an exhilaration of spirits which made the ride an extremely pleasant and enjoyable one. The fragrance in this wild region was very delightful, for in Oman, as in Yemen and in Hadhramaut, many of the plants are very aromatic. We met not a single traveller and saw not a single human habitation on our way; but the soil, though light, did not appear to be infertile, and wanted water only perhaps to make it suitable for man's industry. The vegetation of the plain supports a good deal of insect life, and feathered game was, in consequence, to be seen on the plain—houbara, partridge, plover, sand-grouse rise up in front of us, while timid gazelles and hares, startled from their beds, spring up occasionally from behind bush or sand-heap, or are espied by the keen eyes of the Bedouins trying to crouch and hide from observation.

After half an hour we crossed the Wadi Kalbuh, a fine stream, but not flowing so strongly as the Wadi Halfain, with which it unites further south. At 10 a.m. we came suddenly upon a well in the desert, in a locality where vegetation was more than usually thick, and here

we rested a little while. It is known, after the name of the shaikh whose beneficence caused it to be sunk here, as Bir-al-Hamaid, and is said to be just halfway between Minha and Adam. There is no variety or change of scenery in this gently undulating plain until we begin to approach Adam, when a short range of hills rises up in front of us, cut in two by a deep vale through which lies our road. This singular dip was reached at 12.15, and here we came upon a cluster of hot springs bubbling up from holes and crevices in the hard rock, and sufficiently copious to supply the aqueducts that serve to irrigate the fields and groves of Adam. I observed that one of the felejes or subterranean streams had been newly excavated, and had large and deep shafts. Many work-people were in these pits, both men and women, and other men were engaged in drawing water, but they took no notice of us apparently. Looming above us on each hand to the height of perhaps 800 feet, and almost destitute of vegetation, are the hills I have mentioned—that to the right or westward being called Jebel Sulakh, and that on the left hand Jebel Mushmar.

From this point I obtained the first glimpse of the oasis I had come to satisfy my curiosity about, and I stood a moment to gaze at it. Away in front of us a long, dark, indistinct line appeared like a brown streak on the boundless plain, forming a pleasing and welcome contrast to the glare and the monotonous aspect around. Gradually, as we approach nearer, the mass becomes more definite, and resolves itself into trees, which conceal all the habitations except the huge castle that towers high and majestically over the palm groves, and overtops everything with its square shoulders. This border town is, in fact, a veritable oasis in the desert, and stands forward boldly, isolated and alone, as an advanced patrol of the Hadhr or settled Arabs on the margin of the great wilderness. I had despatched from Minha the day before two messengers to announce our approach, and as we advanced towards the settlement, which we reached about 7 p.m., we observed that a dense crowd had gathered to witness and to welcome our arrival; and it soon appeared that, in view of the hitherto unseen spectacle of a European as a guest among them, all parties had put a truce to hostilities, and were prepared to be neighbours and friends for the moment. I was received with every mark of friendship and cordiality which the hospitable instinct of the Arabs could suggest, my reception here and at other places being a proof of the friendly feeling and high estimation with which the name of England is regarded in this country.

Among the magnates of the Al Boo Saidis here was a cousin of our leader Seyyid Hamood, an agreeable and most courtly youth, who took it on himself to act the part of the host, and who, after ministering to our comforts, proceeded to show us round the place.

The quarter of the town occupied by the Al Boo Saidis, whither I was naturally first taken by my companions, is but a short distance

from the house in which I was lodged, and we therefore set out on foot. I found it to be a walled hujra or enclosure of small area filled with low flat-roofed houses, and separated by narrow alleys, wherein dwelt about 150 families of this tribe. This quarter is called the Jami, and is, for defensive purposes, strengthened at one point by a tower or citadel. This hujra was not particularly clean or attractive, and the interest I took in it was centred on one point, viz. the house and birthplace of Seyyid Ahmed bin Said, the founder of the dynasty now reigning at Mascat.

A small house was shown to me, unpretentious enough, and here was born, about the time Queen Anne came to the throne of England, a man of humble origin (his father having been a camel-driver, and his tribe one of little renown or consideration at that time), who became the champion of his country, having taken the lead in the hour of danger and calamity, and saved it from a foreign invader. About 1742, owing in great measure to the traitorous conduct of Saif bin Sultan al Yaareby, the then ruler of Oman, who had called in the aid of the Persians against internal foes, Nadir Shah had been given the opportunity which he had long cherished and waited for, of conquering Oman. This conquest had been rapidly effected, for in their disunited and enfeebled condition the Omanis were no match for the Persians, who overran the country and occupied Mascat with a strong garrison.

At this time Ahmed bin Said held the position of Governor of Sohar, a town and fort on the Batineh coast, and being a man of uncommon boldness of spirit and force of character, eager and daring enough to take advantage of any opportunity, he soon wrenched the control of affairs from the ruling family, and eventually succeeded in compelling the Persians to evacuate the country. The enthusiasm and gratitude of the Arabs for their liberator, of whom to this day they never speak but with reverence and pride, caused him to be raised to the Imanate. The Yaarebi dynasty, part of the remnant of which I had met a few days before at Saija, was thrust aside for ever, and a new dynasty was founded, of which the present Sultan, Seyyid Faisal bin Toorki, is the fifth in generation and the tenth in succession.

It is a curious coincidence that the ruler of Persia at that time, Tamas Kuli Khan, better known as Nadir Shah, was, like Ahmed, an adventurer who, from being a soldier of fortune of the meanest birth, had raised himself by similar arts to the throne of a great empire. The Iman Ahmed died in 1783 A.D. at a good age, being succeeded by his son Said, a man of a different character, who after some years resigned power to his brother.

On leaving the Jansi quarter, I walked on to the other portions of the town belonging to the Mohariks and their allies, who greatly outnumber the Al Boo Saeedis, and occupy several hujras, the largest of which, containing the Shaikh's house, is called Till. Here I was met

and welcomed by the Mohariki Shaikh, Hamaid bin Khamis, and also by the son of Saif bin Hamood, the Temeemeh of the Jeneba tribe, who was here as a bridegroom, having just espoused a daughter of the Moharik tribe. This latter was a very tall strapping young fellow, with a perpetual grin on his cruel face, displaying a set of large ivories and a crafty look in his eye, harmonizing well with his evil reputation as a slave-runner. I was somewhat surprised to find that I was received with even livelier demonstrations of cordiality than I had been greeted with at the Jami; one gets accustomed to being gazed at by a motley crowd in an Arab town in the interior, but I hardly expected to see the intense curiosity that was exhibited by the good people of Adam of both sexes and all ages, as I visited one quarter after another. In some places I was literally hemmed in by them as they stopped to stare at me, and not content with lining each side of the road as I walked through the narrow lanes and in the shady date groves, many of the children, after I had passed, would scamper round another way to get in front again, and thus obtain a second peep at the stranger. Determined as they were, however, to set no bounds to their curiosity, they were perfectly well behaved and good humoured, and their actions only caused us amusement.

Besides the six quarters of the town I have already referred to, there are two others occupied by the Sheibani and Beni Waeel tribes, making eight altogether, the population of the whole being, I reckon, about 4500. The large castle here, built originally by the Iman Ahmed about the year 1780 A.D., and repaired by Seyyid Azzan in 1869, is considered of little importance, and is weakly garrisoned by the Moharik tribe, to whom it now belongs. The little value placed by the Adamites on this fort is probably due to the remoteness and isolation of their position, which enable them to disregard the current of affairs in other parts of Oman, and to avoid complicity with tribal wars, reserving thus, with entire comfort and satisfaction to themselves, their powder and shot for each other.

Segregated as they are from others, and composed as the population is of such discordant elements as I have described, the social atmosphere of the inhabitants of Adam is by no means a tranquil or unchequered one, for the storms and calms of the political barometer recur with almost undeviating regularity. The Ghafiri faction, which is by far the stronger in this town, and is represented by the Moharik and their allies, is at constant and irreconcilable feud with the Al Boo Sacedis, who, when hard pressed by their enemies, as is often the case, are constrained to call in to their aid the Deru, a powerful Beduin tribe in the neighbourhood. On occasion of serious trouble arising, the Sultan of Mascat is ever ready to mediate and to act the part of grand pacificator; but beyond this His Highness does not interfere. He is, in truth, in a somewhat peculiar position towards the contending parties.

Being himself the head of the Al Boo Saeedi tribe, which is Hinawi, His Highness has, nevertheless, been supported mainly in recent years by the Ghafiri faction, and is thus not in a position to intervene actively in their quarrels.

With regard to the present juncture, the Sultan, who had, it seems, heard of the belligerent attitude of the parties soon after our departure from Mascat, had appointed Seyyid Nasir bin Mohammed to inquire into the causes of the present rupture, and, if possible, to arrange terms of peace, and I was glad to learn afterwards that the truce patched up in consequence of our visit had been preserved until Seyyid Nasir's amicable adjudication put an end to the war.

Adam is a town of some antiquity, and was probably founded by the Parthians before Islam. The word itself is probably old Persian, and there are indications of other Persian settlements in the neighbourhood. There are three felejes here, providing the people with a copious supply of water for all purposes. The springs are thermal, and I found the temperature of one of them to be 102° Fahr., while others ranged up to 112° Fahr., this heat being no impediment to animal life, as frogs and fish in abundance swim about in it. The elevation above the sea is 850, being 500 feet lower than Minha. Adam is the most advanced town of Oman towards the Great desert, and stretches out into the sandy ocean of Arabia. It forms a convenient market for the Beduin to resort to for provisions and other necessaries.

On the 17th I rode back across the strip of desert country to Minha, the nearest settlement to Adam, from which it lies distant about 25 miles. Minha has a population of some 2000 souls, but though thinly peopled, it covers a considerable area of ground. The soil is well watered and fertile, and produces abundance of corn and fruit of various kinds. It has been well described by Wellsted, who gives a glowing account of the extent and luxuriant beauty of the diversified cultivation around. He saw it in all its prodigality of production in the month of September, but at this time winter had thrown its dull and sombre garb over the scene, and though ripe fruit still clung to the trees in the orchards, there were no fields of golden grain.

My original intention had been to visit Nezwa before proceeding on to Bahila and Al Dhahireh; but though this plan would have saved us a day's journey, I resolved, after consulting with Seyyid Hamood, to march direct to Bahila the following day, my object being to inspect the intervening unexplored tract. I tried in vain to obtain an idea of the distance hence to Bahila, as no two agreed in their estimate. The Arabs have no means of measuring distance, and consequently time becomes the standard in reckoning a journey. The vagueness of this, however, may be conceived when it is remembered that these people have no means of measuring time any more than they have of distance, and thus every man had to judge by a standard of his own.

On the 18th, starting at 8 a.m., we reached Karsha, a hamlet of seventy houses, at 9, and half an hour later crossed the Wadi Kalbuh, here a broad but shallow stream. The country we were passing through is level and monotonous, bare and stony, sparsely inhabited and cultivated, though not devoid of desert vegetation. At 10.45 we stopped at Timsa, a small village situated under a hill, to drink coffee with the shaikh, who had, in a very friendly manner, intercepted us on the road with a noisy retinue to press his invitation, which indeed we were not at all disinclined to accept. Remounting our camels, we soon came to Kumaili, a dark pool of water lying under the projecting ledge of an isolated rock on the plain, which has been famed from time immemorial as a mystic well of peculiar power. This rock has a remarkable appearance, being cleft asunder, and disclosing a deep fissure or chasm, at the bottom of which lies the well; it is dreaded and revered by the superstitious Beduin as the habitation of magicians. The water is said to have become red from the blood of an unfortunate wretch who lies imprisoned by enchantment deep down under the spring, and it is affirmed that any one venturing to drink of it falls immediately under the spell and power of the magician. The water is, however, as I can attest, quite clear and potable, and all my party, except a few of the Beduins, drank of it unhesitatingly.

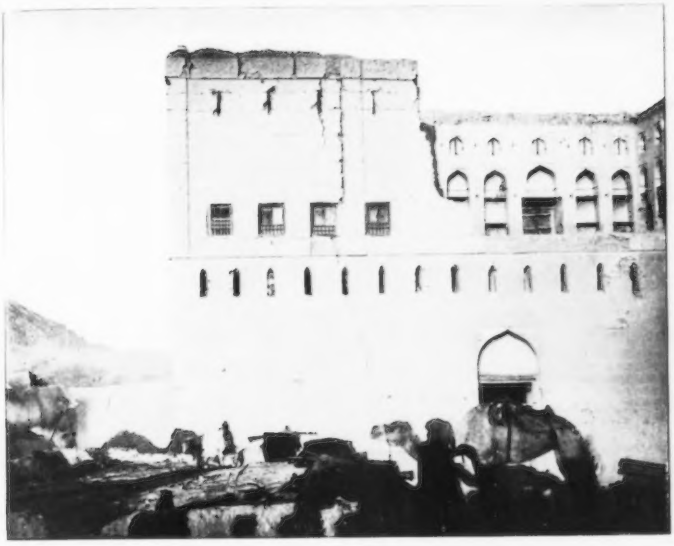
There are two kinds of magic in Oman, lawful and unlawful, both of which are articles of faith among the Arabs of all classes. Of the former one hears little, as few know anything about it, but the latter is Satanic and widely credited and dreaded. Though Babylon is referred to as the home of the black art, it happens that it is chiefly practised by negresses, who have brought over with them much of their African witchcraft, fetishism, and divination. In Muscat and other large towns the Arab ladies and negress sorcerers are said to hold midnight *séances* for the practice of "sehr," at which curious things take place, if one may believe the men. The husbands disapprove of this, and would check it if they could; but the women are more credulous, and are much afraid of negress witches. The inventors of magic are the two angels Haroot and Maroot, who are suspended head downwards in a pit under a huge mass of rock near Babylon. It is possible that the pit I saw near Bahila obtained its evil reputation from some fancied resemblance to this pit, the description of which is well known to Arabs, and which is referred to in the Koran. Hard by are to be seen the crumbling ruins of the tomb of a saint. I could obtain little or no traditional history about this spot, as the Bedouins were very reserved; but it is possible that it marks the site of an idolatrous and pagan temple of the pre-Islamite Arabs.

From this point we pursued our way over hard ground among low black hills without sign of habitation save one small hamlet named Foot, and soon after the outline of the distant town of Bahila, the

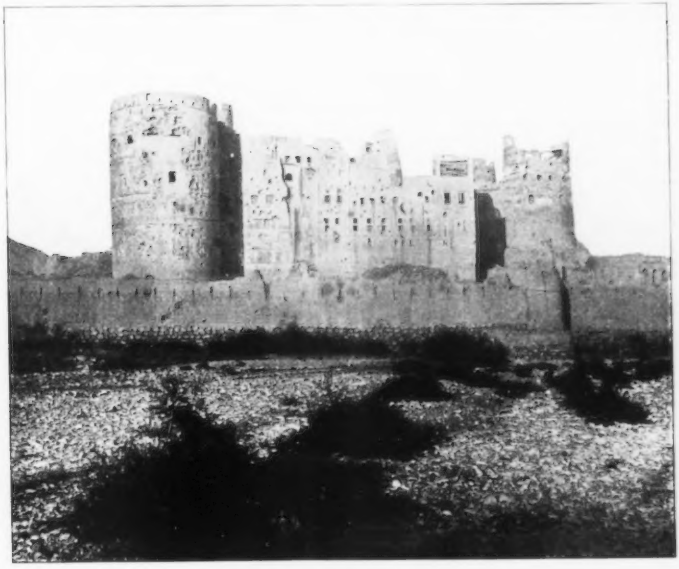
name of which, I may observe, is spelt Barler in the maps of Wellsted and Badjer, begins gradually to steal upon the eye and form itself into a distinct picture. We sight first the high tower of a castle in the centre, with a long, low, white circumvallation of considerable extent studded with bastions at intervals and flanked by the bed of a stream, there being no gate visible on that side of the wall we were approaching. Presently within the irregular square space enclosed by the wall appeared a confused medley of palms and other trees, houses, mosques, green fields, and gardens, amidst which, and perched on an eminence in the centre, stands a massive and venerable pile surmounted by a lofty tower commanding and overlooking the entire surrounding country.

From the time they had sighted our party traversing the dark and barren plain the garrison had continued to fire guns from the walls at intervals as we approached, the roar of which reverberated in the recesses of the hills. We had to ride under the wall some distance, and then, turning an angle, we descended abruptly into the bed of the Wadi Bahila; and as we drew nearer the chief of the town, Shaikh Nasir bin Hamaid, with his mounted retinue, followed by a large concourse, issued from the massive archway which faces the wadi and forms the main entrance to the city, and rode slowly down the broad and sandy watercourse to meet us. Riding close up, the shaikh shook hands with me, and we exchanged formal greetings and salutations. I then expected we should ride together to the city, but the ceremonious part of the reception was not yet over. My party had, in the mean time, drawn into line on the edge of the bank under the wall, while the shaikh, now quitting my side, led his followers on to a smooth strip of ground and entered upon the more serious and important part of the programme, without which the istikbal or reception would not, in Beduin eyes, have been complete. The performance consisted of a display of horsemanship, twirling and firing their matchlocks at full speed, running races by twos with each other, and similar exercises, much to the delight of the populace and to our weariness, for we were tired and thirsty after our march, and would have been glad to dismount and rest. However, we had to look on and look pleased for the best part of an hour, by which time the shaikh's horse was fairly blown; and then we formed procession and marched slowly and solemnly on through the streets of the town, which were lined with gazing spectators, until we reached the spot where we were able to alight and unpack our baggage.

The little house allotted to me was convenient and in a pleasant garden, and here, an hour later, Shaikh Nasir paid me a complimentary visit; and when this interview and breakfast were over, I spent the rest of the day in riding about the town and obtaining a general notion as to the disposition of the area enclosed within the fortifications.



SEYYID HAMOOD BIN AZZAN'S HOUSE AT ROSTAK.



THE OLD FORT OR CASTLE AT ROSTAK.

My return visit to the shaikh having been arranged for a certain hour on the following day, I proceeded to the castle accordingly, and was received by the shaikh with due Arab formality and courtesy. He was quite a young man, apparently not more than twenty-two, slight and agile figure and quiet manner; but what most arrested my attention during the interview, which was not a long one, was his heavy-featured, sallow, and forbidding countenance, which was entirely in keeping with the reputation he had recently earned throughout the country. His seizure of power by wading through the blood of his own brothers, though a sufficient evidence, in Arab eyes, of his determination of character and fitness for command, had undoubtedly rendered him an object of distrust and repugnance to his tribesmen; and as a glimpse of Arab life, I may as well relate here briefly the tragical events in which he played so conspicuous a part.

A few years before my visit, the old temeemeh of the Beni Ghafir tribe, Shaikh Hamaid bin Rashid, had died, and had been succeeded by the eldest of his three sons, Barghash. The old shaikh, Hamaid, had been esteemed and respected, but the sons did not share their father's popularity. Barghash had not long assumed power before troubles arose, chiefly in connection with the fort at Boo Einein, a much-coveted possession, and regarding which we shall have to speak later on. Barghash's relations with another powerful Ghafir tribe in that region, the Ibriyeen, had become complicated; his younger brother Rashid had married an Ibriyeen girl, and his own sister had married into the same tribe, but, notwithstanding this, he cruelly murdered two of the Ibriyeen. Partly in revenge for this and partly for political reasons, Rashid and the husband of Barghash's sister resolved to murder Barghash, and invited him to coffee at his sister's house near Bahila. Barghash unsuspectingly accepted, but his sister, having been apprised of the plot, met him on the road and warned him. Barghash returned home, and prepared at once to attack the would-be murderers, but they took refuge with the Ibriyeen. These events happened in 1882 or early in 1883, and Barghash, whose influence was rapidly declining, and whose conduct had alienated not only his own tribe, but all the Ghafiri faction, was soon to fall by the hand of his youngest brother Nasir. This youth, the present governor, was of a malevolent and intriguing disposition, and was so much feared and mistrusted by Barghash that the latter, suspecting his evil designs, took the precaution to provide him with a separate residence, and forbade his entering the castle. Barghash's fear proved to be only too well founded; but the measures he had taken were not sufficiently stringent to defeat the treacherous wiles of the young fratricide, for Nasir, having conspired with his weaker but equally vicious brother Rashid, contrived a scheme that was not likely to fail. In December, 1883, Nasir succeeded in bribing three of Barghash's slaves who formed his guard, and with

the help of these men concealed himself one night in the castle. Creeping silently to his brother's apartment, he shot him dead while lying asleep, and then, leaving the women and domestics, who had been roused by the noise, petrified with terror, returned unmolested to his own house.

The next day Rashid, the second son of Hamaid, was proclaimed by Nasir and other conspirators Shaikh of the Beni Ghafir tribe. Rashid, an indolent voluptuary, soon allowed the direction of affairs to fall entirely into the hands of Nasir, who four months later, in March, 1884, becoming weary and impatient of the situation, resolved to put an end to it. Watching his opportunity, and having prepared his own followers for the event, he treacherously shot the unsuspecting Rashid through the back one afternoon while they were riding out to Yabreen together. No disturbance ensued, and no hand was raised against Nasir, who took quiet possession of the castle. But though his ascendancy had remained undisputed, and he had been acting as Wali of Bahila on behalf of the Sultan, he had not so far been recognized as temeemeh of the Ghafiri faction in place of his brother Barghash, nor had his tribe condoned the murder of Shaikh Barghash. I was assured by some persons, however, that the Beni Ghafir were not sorry to lose their last chief, the incompetent Rashid.

The castle is a large, substantial, and handsome edifice, and is called Hisn Tamah, from the name of the Nebhani chief who is supposed to have built it, though there is reason to believe it is founded on a very ancient and perhaps Parthian structure. The Nebhani dynasty in the fourteenth and fifteenth centuries made Bahila the capital of Oman, and this castle was the residence of those rulers. It is ornamented with two towers, which command a splendid view of the whole valley, and one of which is, I think, the loftiest structure I have seen in Oman, and I was careful to photograph it. It is called Burj al Rih, or the Wind tower, and has apartments in it for use in the hot season, when the open and elevated windows let in the welcome breezes from all quarters. The town comprises twenty separate enclosures or divisions called haras, and contains a population of about 6000 souls. The larger or upper part of Bahila is occupied chiefly by the Beni Ghafir, the predominant and most numerous tribe, while the Sifala, or lower part, is inhabited by the Beni Shikail, Ibriyeen, and others.

The outer wall, embracing the town and cultivation, appeared to be an irregular parallelogram covering an area of about 2 square miles. It affords a useful protection against raids of their predatory neighbours in Al Dhahireh, who are ever making incursions into others' territories, but it is not defensible against a serious and organized attack by powerful tribes. It is traditioned to have been planned and built—as I was informed by our guide, Shaikh Nasir el Kelbani, who bears the title of Wazeer of Bahila—at a great cost by a woman named Gheitha

about six hundred years ago. As I rode hither and thither about the place, I noticed fields of wheat, jowari, barley, lucern, sugar-cane, and cotton, besides the inevitable palm clumps and orchards of other fruit. The manufactures here are cotton loongies, or waistcloths, made of the khodrang or natural brown cotton, goat's-hair cloaks, mats, halwa, etc. The inhabitants have good houses, some of them three-storied, most of them built of sunburnt brick, and all of them flat-roofed. The people seemed to be generally well off and contented, but were still lamenting the damage done to houses, crops, and trees by the hurricane in the previous spring.

The Beni Bahila tribe, from which the town derived its name in ancient times, is probably the Bliulei of Ptolemy, and is now extinct in Oman, having become absorbed in other tribes. It is uncertain whether it was of Kahtanic or Maaddic extraction, as there appears to have been two tribes of the name. The ancestress of the Kahtanic Yemenite tribe was Bahila bint Kaab, who married first Malik bin Asor, and secondly Maan bin Malik. Maan's sons by other wives, however, also became known as Beni Bahila.

The Maaddic tribe of Bahila, which is probably the one that migrated to Oman, derived from Bahila bint Yasir bin Kais Ailan. The tribe had an unenviable reputation, and was one of the many tribes disliked by the Arabs. I found Bahila on the whole a very interesting place; the attitude of the people towards myself and party was especially friendly, and I should like to have remained some days here, but circumstances did not permit.

In the afternoon, accompanied by a cavalcade headed by Shaikh Nasir bin Hamaid, who insisted upon showing me the road, we started for Yabreen, which is about 4 miles down the Wadi in a northerly direction, and which I could not neglect the opportunity of visiting. The Beni Ghafir horsemen, following the example of their shaikh, amused themselves all the way by galloping about and running races with each other, as if they were out for a holiday, and I dare say my people would have gladly joined them in their exercises, and exhibited their own skill in the saddle, had they been on horseback instead of on camels, as Arabs dearly love and enjoy a display of horsemanship.

Yabreen fort is small, but in good repair, and is garrisoned by six Arabs. It is without a dependent township, and there is no settled population. Formerly it was of more importance, and in the palmy days of the Iman Seyyid Belarab bin Sultan al Yaareby, who built the castle about the year 1690 A.D., Yebreen was temporarily the capital of Oman, or at least the seat of government, and could then boast of an extensive madressa, or college, for the encouragement of learning, the renown of which is now smothered in its dusty ruins. Bahila and Yebreen stand in an angle of the great chain formed by the mighty mass of Jebel Akhdar to the north-east and its outlier Jebel al Koor to

the north-west, these mountains thus protecting and overshadowing them on two sides, while on the other flanks the vast wilderness, bare and open, unrolls itself interminably, until the sight fails, and sky and earth mingle imperceptibly together. As the sun sets here it reveals in all its glory and distinctness of outline the noble mountains I have mentioned, Jebel al Kur, which raises its peaks upwards to an altitude perhaps of 5000 or 6000 feet, and forms the geographical boundary, as well as natural barrier, between the provinces of Oman and Al Dhahireh. It stands isolated and almost entirely detached, as it appeared to me, from the Jebel Akhdar range.

Under a grand old tamarind tree near this castle of Yebreen we camped for the night very comfortably, our baggage having been brought up from Bahila during the evening, my plan being to turn back eastward and pay a visit to the large and ancient city of Nezwa, the ancient capital, before quitting the province of Oman, and crossing over to El Dhahireh. The elevation of Bahila by aneroid is 1550 feet, and of Yebreen 100 feet less. The main road connecting these two provinces passes to the south end of Jebel al Koor, and is called by some Nejd el Makharim, and by others the Nejd el Dhahireh, its low elevation—for it is said not to exceed 400 or 500 feet above the plain—rendering it an easy and convenient passage.

The pass at the north-east end of the mountain is of a very different character, being about eight times the altitude of the other, and infinitely more difficult and precipitous. It is known as the Nejd el Barak. After making due inquiries among the Arabs, and hearing their description of these passes, I resolved to cross over to El Dharireh by the northern pass subsequent to my visit to Nezwa. As will be seen presently, this decision, though adopted to harmonize with my own plans, and entirely fortuitous as regards local contingencies, turned out very fortunately for us.

Early on the 20th I despatched a Kossid from Yabreen with a note to Shaikh Hilal al Hinawi, to give him notice of our intended visit to Nezwa, and about 8 a.m. we mounted and began our march thither. Ascending the Wadi Bahila, we passed that city and proceeded thence in an easterly direction over a stony, bare, and lifeless plain, intersected by a few watercourses, sighting in our course but one hamlet with a patch of cultivation, wheat, sugar-cane, and indigo, situated in the Wadi Musabli, until we reached at 2 p.m. the village of Tanuf, which lies at the entrance of the wady and pass of that name. Here we were met by the Shaikh Suliman bin Saif al Riyami, whom I had seen some years before at Seek, and who had ridden out to intercept us, and to entreat me to stay a night with him, saying that in view of his long and staunch adherence and loyalty to the Sultan, His Highness Seyyid Toorky, it would be a discredit and reproach to him in the eyes of his tribe and of his neighbours if we passed his town without accepting

his shelter and hospitality. I had not in truth foreseen this rather embarrassing request, and though I could not but acknowledge the force and reasonableness of it, I was unable to comply as the Governor of Nezwa was already expecting us, and I could not in decency now change the programme and stop on the way. There was, indeed, only one way of escape out of the dilemma, and I pacified the shaikh by promising to halt one night at Tanuf on our way back from Nezwa.

It was 3.30 p.m. before we reached the outskirts of the city, for we had been riding leisurely and had taken six hours to do the space which lies between the old capitals, Bahila and Nezwa, the road having been over rough ground nearly the whole way. As we passed the outlying watch-towers commanding the various approaches, the guards therein fired their matchlocks to give warning, which was soon responded to by the thunder of the guns of the great fort. The appearance of Nezwa from the direction in which we entered it was neither picturesque nor imposing, but it was with feelings of pleasure that I rode then for the first time into the ancient capital of the country in which I had so long resided, and was thus able to see with my own eyes a city not only of much interest in itself, but historically and traditionally associated with so many of Oman's rulers, so many of her illustrious sons, and the battle-ground of so many invading and devastating armies. Nezwa is one of the first sites occupied, and the one characterized by the most salient incidents in the national life. It is the theatre in which have been enacted many of the most momentous events chronicled by the historians of the country.

Descending into the bed of the Wady Kalbuh, and thence entering the streets, which were thronged with people who had assembled to witness our arrival, we were met and greeted very civilly by the governor, Shaikh Hilal bin Zohair, who, after shaking hands, conducted us to his public reception hall, which was situate within the gate of the walled quarter where he resided. Here we all sat down on cushions, exchanging compliments and conversing, coffee in the meanwhile being roasted, boiled, and distributed to the assembled guests according to established Arab usage, but no pipes or cigarettes, as smoking is not indulged in by the Ibadhis. After a short interval I rose and was conducted to my allotted abode. An hour later I received the customary visit of ceremony from the shaikh, who began the conversation by informing me that the house I was lodged in belonged to a brother of Seyyid Nasir bin Ali, the good old wali or governor of Mascat of twelve years back, who was murdered in his house there in 1873.

Shaikh Hilal bin Zohair was a tall dignified man, very stoutly built for an Arab, with pleasing manner and a fine, intelligent, and expressive countenance, not devoid, however, of a certain craftiness of look.

He was considered at this time one of the most prominent and influential shaikhs in Oman, not so much in virtue of his being the

chief shaikh of the noble and powerful Beni Hina, as on account of the adroit diplomacy he had shown in raising himself to his present high official position as Governor of Nezwa, which had hitherto been reserved for a member of the ruling family.

About five years previously the former wali, Seyyid Hamaid bin Saif, an amiable and sagacious, but rather eccentric old gentleman, who had held the post for many years, had succumbed to the intrigues and machinations of his enemies and had been succeeded for a short time by Seyyid Faisal. The change was followed by a series of injudicious interference, and disputes with the local tribes on the part of the Mascat government, and a struggle for Nezwa ensued, which eventuated in the great fort being taken possession of by Shaikh Hilal bin Zohair, who became the virtual governor of the locality.

The Nezwa policy of the government excited much irritation among the Sharkiyeh and other tribes, and was undoubtedly one of the chief causes of the great coalition which culminated in the attack on Mascat in September, 1883, by far the most formidable and determined effort on the part of his rivals that Seyyid Toorky had to encounter during the whole of his reign.

Shaikh Hilal bin Zohair had taken no part whatever in this rising, but had throughout maintained a loyal and friendly attitude towards the Sultan, in consequence of which he had been restored to favour and confidence by His Highness, and had been confirmed in the post of Governor at Nezwa. He died in 1894.

The shaikh paid me an early visit the next morning, and we had a long and interesting conversation, in which he communicated much information concerning the history, ancestry, and traditions of his tribe, about which he seemed never tired of talking, and about the topography of Nezwa and its neighbourhood, replying to my questions very courteously. He told me that the textile and embroidery industries here, once so famous and extensive, had entirely disappeared; that a little cotton, both of the white and brown species, was still grown; and that indigo was largely produced for dyeing the Bombay and American cottons, now so much imported.

After breakfast I took a walk through the town and environs to make myself acquainted with them, and found them so extensive that they required some time to realize the varied aspect of the whole.

The city is unwalled, and the space it covers is a medley of walled quarters, intermingled with groves of graceful palms, fruit, orchards, odorous gardens, and running streams, which, backed and sheltered by the grand mountains above them, present a remarkable picture of wild, natural scenery combined with luxuriant fertility and the evidence of human prosperity. The familiar features of the flat-roofed houses and palm-leaf huts presented nothing striking;

even the mosques are plain, unornamented, and unpretentious, as the magnificent Saracenic architecture of Mesopotamia, Syria, and Egypt is entirely absent from this simple land. I visited more than once the busy and thriving bazaars, which were well supplied with the commodities required by the people, and which, though of course a repetition of those at Mascat and Semail, Bahila, and Sohar, were nevertheless of singular attraction. Such glimpses of Arab life as watching the coppersmiths, braziers, dyers, and others working in their primitive Oriental manner, are always fascinating and calculated to arrest the gaze of a stranger. Among the artisans are makers of camel-saddles, potters, silversmiths, cobblers, cameleen weavers, carpenters, makers of hulwa—the national sweetmeat, for which Nezwa is famous, as it has a different flavour from that of Mascat, and is largely exported—blacksmiths, sugar or treacle makers, masons, mat weavers, and others. But the most noteworthy part of the bazaar, which is only shaded from the sun by strips of matting here and there, and is not particularly clean, is the copper market, which though inviting by the quaintness of its wares, is repellent from the incessant noise and deafening din of the hammering going on. The copper and brass work here made is distributed throughout Oman, the metal being imported in bars and sheets from Bombay, though formerly it was produced, it is said, in the country in considerable quantity.

The climate of Nezwa is very salubrious, with fresh exhilarating breezes by day and chilly cold nights in the cold season, and scorching heat, hot simoom winds in July, but dry and healthy always. The desert wind or simoon here blows from the south-west, and is very injurious to fruit trees, and sometimes carries blight to the corn. The elevation of Nezwa is 1450 feet.

Many of the tribes of the country are represented here dwelling together in amity, and compose the greater part of the population, but they are all in subordination to the two great rival clans which divide the power, dispute the supremacy, and keep their distance. These two tribes, the Beni Riyam and the Beni Hina, preserve an independent attitude, occupy separate parts of the town, and though rarely actually at war, maintain an ancient feud, and are mutually jealous and distrustful. The Beni Riyam, who are supposed to be the earliest inhabitants of the town, belong now to the Ghafiri faction, though originally from the Yemen, and are thus politically opposed as well as locally and tribally antagonistic to the Beni Hina. The Riyamis are by far the stronger of the two, hold the Alaya or upper part of the vale in which stands their hara, or quarter, known as Semed al Kindi, and their strong fortlet, the Bait al Silait. It tells in their favour that they are able to dam the stream and cut off the supply of water from the other part of the town.

Shaikh Hilal bin Zohair, since he seized the fort and became

acknowledged as wali, or governor, has considerably strengthened his position, and reinforced his fighting material by sedulously encouraging in various ways members of his own tribe to bring their families in from other districts and settle here. The Beni Hina now occupy Akr, the chief of the six haras into which the Sifâla or lower town is subdivided, and as the great fort is in this quarter, and garrisoned by them, the position they occupy is not easily assailable.

The hara of Akr is enclosed by a high wall, and is entered through a well-built and massive gate called the Bâb al Sook; it contains altogether, I was told, 880 houses. Khorâsin, contiguous to Akr, is also surrounded by a wall; but Soal, which lies to the east of Wadi Abyad, is open and unprotected. There is also a hara called Khorâsitin, and another known as Harat al Wadi, from the fact of the Wadi Kalbuh running through it. The two wadis, Kalbuh and Abyad, divide the town and become confluent near the market under the fort. These two larger streams are fed by two minor ones, viz. the Wadi Musâbli and the Wadi Tanuf, the junction of Kalbuh and Tanuf being in Alaya, close to Bait al Silait. Nezwa is thus the meeting of four streams, and, as water is the great source of plant life in hot climates, Nezwa may be said to surpass all the towns of Oman in its supply of water, in natural wealth, and in the industry of its inhabitants.

As may be supposed, numerous feljes are drawn from these sources, which yield a most ample supply for irrigation and other purposes. It seemed to me that the most abundant flow was in the Wadi Abyad, or White river. I may here make the suggestion that the Wadi Kalbuh is the Alfulh of the Sicilian geographer Edrisi, who, however, gives it a wrong direction, as it flows not northwards but southwards, and joins the Wadi Halfain as mentioned above. Edrisi's Soal and Afra are no doubt Soal and Akr, the two largest quarters of Nezwa. His name for Jebel Akhdar, viz. Jebel Sharm, is merely a corruption of Jebel Shiraizi, the latter being the name of the chief town on the mountain. Nezwa is famous for its dates, which are nearly all of the Fard variety, and the vast multitude of palm-trees add immensely to the beauty of the settlement, and may be considered one of the chief sources of wealth to the people. Yet, notwithstanding the enormous production of these prolific trees, whose fruit almost takes the place of bread to the hardy Arab, the local consumption is so great that only a comparatively small quantity of the harvest is exported.

(To be continued.)

INTERNATIONAL MAP OF THE WORLD.*

THE resolutions arrived at by the International Map Committee, which met at the invitation of the British Government in London in November, 1909, have now been officially issued. The following is a list of the delegates of the different Governments represented :—

Austria : Professor Dr. Eduard Brückner, of the Imperial Royal Society. *Austria-Hungary :* Counsellor Vinzenz Haardt von Hartenthurn, of the Imperial and Royal Institute of Military Geography. *France :* M. Beurdeley, Sub-director of the Geographical Service of the Colonial Office ; M. Ch. Lallemand, Director of the Survey of France ; Commandant Pollachi, head of the Cartographical Section of the Geographical Service of the Army ; M. Vidal de la Blache, Professor of the University of Paris. *Germany :* Professor Dr. Joseph Partsch, of the University of Leipzig ; Professor Dr. Albrecht Penck, of the Geographical Institute of Berlin University ; Major Baron von Tettau, of the General Staff ; Major Wilckens, of the General Staff. *Great Britain and British Dominions :* Lieut.-Colonel C. F. Close, head of the Geographical Section of the General Staff, Honorary Secretary, Royal Geographical Society.; Colonel S. C. N. Grant, Director-General of the Ordnance Survey, President of the Committee ; Dr. J. Scott Keltie, Secretary of the Royal Geographical Society. *Australia :* Mr. Cecil W. Darley. *Canada :* Mr. R. E. Young. *Hungary :* Dr. Ludwig Loczy, President of the Royal Hungarian Geographical Society, with his secretary, Dr. Kogutovicz. *Italy :* Lieut.-Colonel Cavaliere Eugenio Caputo, of the General Staff ; *Russia :* M. Eugene Markow, of the Imperial Russian Geographical Society. *Spain :* Don Luis Cubillo, head of the Cartographical Department of the Geographical and Statistical Institute. *United States :* Mr. Bailey Willis, and Mr. S. J. Kubel, of the United States Geological Survey. Secretary to the Committee : Captain T. T. Behrens, of the Geographical Section of the General Staff. Adjutant to the President: Captain W. J. Johnston, of the Ordnance Survey.

The following are the resolutions unanimously voted by the Committee :—

General Resolution.

1. It is desirable that a uniform set of symbols and conventional signs be adopted by all nations for use on the map of the world on the scale of 1 : 1,000,000, and that the limits of the sheets, etc., shall be uniform.

Area of Each Sheet.

2. (*a*) Each sheet of the map shall cover an area 4 degrees in latitude by 6 degrees in longitude.

(*b*) North of latitude 60° N., and south of latitude 60° S., it shall be permissible to join two or more adjoining sheets of the same zone, so that the combined sheet covers 12, 18, degrees, etc., of longitude.

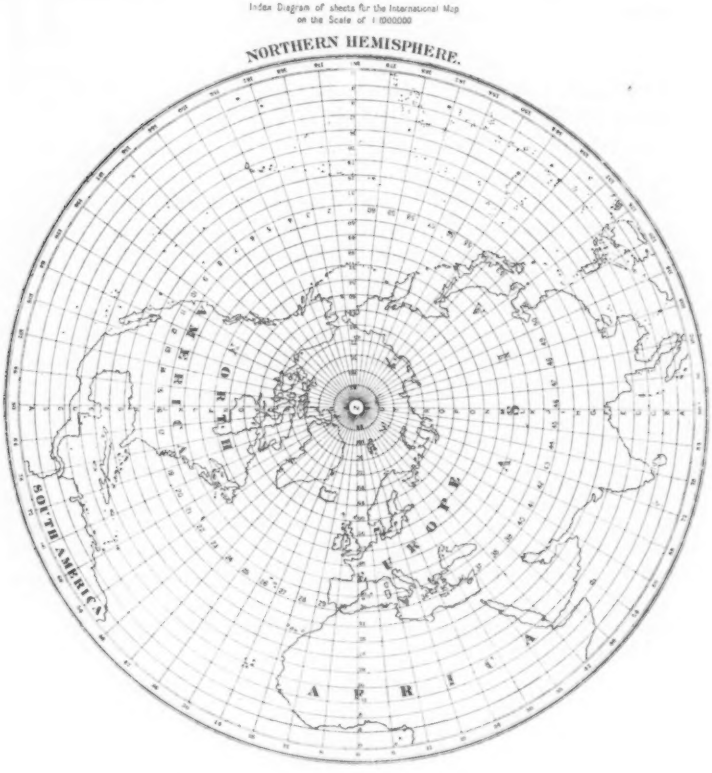
* Map, p. 248.

Limit and Number of Sheets.

3. (*a*) The limiting meridians of the sheets shall be at successive intervals, reckoning from Greenwich, of 6 degrees; and the limiting parallels, reckoning from the Equator, shall be at successive intervals of 4 degrees.

(*b*) Each sheet of the map shall bear an international number, as shown on the attached diagram, thus: North B. 12.

The zones, extending from the Equator on each side to 88° latitude, are given letters from A to V preceded by the words North or South.



The polar areas are lettered Z.

The sectors, from longitude 180° E. or W. of Greenwich, are given numbers from 1 to 60, increasing in an easterly direction.

(*c*) Each sheet shall, in addition, bear the name of the locality or most important geographical feature on the territory represented, and also the geographical co-ordinates of its central point.

(*d*) Each sheet shall show a small index diagram, giving the names and numbers of the eight surrounding sheets.

Degree Lines.

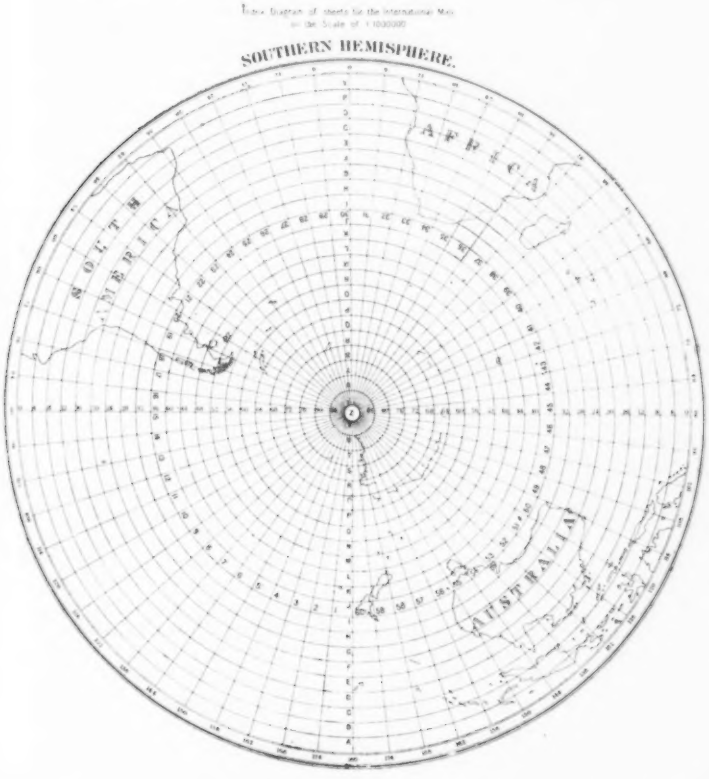
4. Each degree line shall be drawn right across the sheet.

Projection.

5. (*a*) It is necessary that the projection should fulfil the following conditions:—

(i.) The meridians should be straight lines.

(ii.) The parallels should be arcs of circles of which the centres should lie on the prolongation of the central meridian.



(*b*) In view of the fact that on the scale proposed several suitable projections differ but little from each other, and that the contraction and expansion of the paper on which the map is printed affect all lengths on the map, and prevent it from being in fact exactly either orthomorphic or equivalent, it is not necessary to lay great stress upon the selection of a projection which has the best properties as to conformity or equivalence. It is therefore agreed to select a projection which can be easily constructed, and which permits every sheet to fit exactly together with each of the four sheets adjoining each of its four sides.

A modified polyconic projection, with the meridians as straight lines, satisfies these two conditions.

(*c*) The projection shall thus be constructed: Each sheet shall be plotted independently on its central meridian. The central meridian shall be a straight line marked off in degrees.

Through the points so marked circles are drawn to represent the parallels. The centres of the circles are situated on the prolongation of the central meridian. The radius of any circle $= \nu \cot \lambda$, where ν is the normal terminated by the minor axis, and λ is the latitude of the parallel represented.

Along the limiting parallels, *i.e.* along the circles forming the north and south edges of the sheet, the degrees of longitude are marked off in their true lengths to scale.

Corresponding points on the limiting parallels are joined by straight lines; these straight lines represent the meridians.

The meridians which are true to scale are those which are 2 degrees to the east and west of the central meridian respectively. The actual length of the central meridian is the true length to scale, minus the small correction which is necessary to effect this, and which is shown in a special table.

Hypsometric Colours and Contours.

6. (*a*) The map shall be a hypsometric map, *i.e.* the successive altitudes shall be indicated by a system of colour tints.

There may, however, be published other editions without altitude tints, and these may be completed by tints, or by additions required for other purposes.

(*b*) Normally contours shall be drawn at vertical intervals of 100 metres reckoning from sea-level. But in very hilly districts the contours may be at larger vertical intervals, provided that they are spaced at 200, 500, or 1000 metre intervals. In very flat country additional contours may be inserted provided that they are spaced at 10, 20, or 50 metre intervals.

(*c*) Minor features of importance, which would not be shown by the contouring, may be represented by shading, excluding hachuring, and in that case the method of lighting which is the most effective for the region will be selected

(*d*) In parts where the country is not sufficiently surveyed to enable the contours to be drawn, the terrain shall be shown by broken contours or form lines.

(*e*) The form of the bed of the sea or of a lake shall be shown by blue contours, the vertical intervals being normally 100 metres, but intervals of 10, 20, or 50 metres may be used. The datum level in each case is to be the mean surface level of the sea, or of the lake for a given date.

Lettering.

7. (*a*) The lettering shall be in varieties of the Latin characters.

(*b*) In those cases in which the Latin characters are not in use in the country in which the sheets are produced, a supplementary national edition may be published.

(*c*) A distinction shall be made between the lettering applied to Hydrography and that applied to other features. The former shall be in sloping characters, the latter in upright characters, except as provided for names applied to routes of communication.

(*d*) The attached classification of and general types of standard lettering are approved for use on the International 1 : 1,000,000 map. The question of gauge

has been left entirely to the discretion of the cartographer. It is understood that the size of lettering will vary with the relative importance of the names.

(*e*) All figures denoting heights shall be upright.

Figures denoting depths shall be sloping.

(*f*) The lettering used for scales, sub-titles, and other explanatory matter appearing outside the sheetlines of the map shall be in upright Roman capitals and lower case.

Spelling and Transliteration of Names.

8. (*a*) The spelling of every place-name in an independent country, or self-governing dominion, using the Latin alphabet, shall be that adopted by the country or dominion.

(*b*) The spelling of every place-name in a colony, protectorate, or possession shall be that adopted by the country governing the colony, protectorate, or possession, if that country uses the Latin alphabet, or publishes other maps in which the place-names are printed in the Latin alphabet.

(*c*) In the case in which certain important localities have also, in addition to the official name, another customary name notably different, the latter shall be printed on the map, in small characters, underneath the official name.

(*d*) An explanatory legend shall be printed to show, with reference to the names on the sheet, the Latin letters which are necessary to represent the same sounds in other languages employed in the international map.

(*e*) It is suggested that the Governments of those European or extra-European countries which do not use the Latin alphabet, should publish an authorized system of transliteration.

(*f*) In the case of Chinese place-names, that transliteration shall be adopted which is used by the Chinese post and customs service. The same rule shall apply to other countries in which similar conditions obtain.

Colours of Detail.

9. (*a*) Hydrographic features, including glaciers, shall be in blue.

Water shall be shown by a uniform tint of blue wash, and not by water-lining.

A distinction shall be made between perennial and non-perennial streams.

(*b*) Contours shall be in brown.

(*c*) Roads shall be in red.

(*d*) Railways shall be in black.

(*e*) The name of feature shall be printed in the same colour as the conventional sign of the feature itself, with the exception of mountain names, which shall be in black.

(*f*) The hypsometric tints shall be those of the attached colour scheme.

(*g*) Country lying below the mean level of the sea shall be shown by a special tint of dark green.

Scales.

10. (*a*) A scale of kilometres shall be drawn on each sheet.

(*b*) An additional scale of miles, or other national unit, may be drawn if required.

Heights.

11. (*a*) The heights above mean sea-level shall be shown in metres.

(*b*) The values in feet, or other national unit, may be added, to the nearest unit, if desired.

(*c*) The heights of the mean levels of the surfaces of lakes and inland seas above mean sea-level shall be given.

(*d*) The datum level both for heights and depths shall be the mean sea-level, deduced in each country from tidal observations on its own coasts.

Conventional Signs.

12. (*a*) In the case of rivers, rapids and other obstructions to navigations are, as far as possible, to be indicated.

(*b*) Roads and tracts should be divided into two classes, those which are suitable for wheeled traffic, and those which are not.

(*c*) It is agreed that where it is decided to represent features provided for in the attached reference they shall be shown by means of the conventional signs given here.

In the case of details not provided for below, other signs may be used at the discretion of each Government.

(*d*) For convenience of reference and indexing, the inner margins of each sheet shall be provided with Arabic letters from top to bottom of each side margin, and with Roman numerals from left to right along both the upper and lower margins.

Two of each (letters or numbers) shall appear within each degree of latitude or longitude respectively (see sheet of conventional signs).

(*e*) At the foot of each sheet shall be printed a Reference, explaining all the conventional signs used in that sheet.

(*f*) Each sheet shall bear a list of the principal sources of information from which it is constructed.

Exchange of Material.

13. In the case in which a sheet covers an area belonging to several neighbouring countries, it is desirable that the Government producing the map should consult the Governments of the other countries on the subject of the material available, especially as regards the nomenclature.

There will be found in the text a reduced copy of the Index Diagrams of the sheets for the International Map on the scale of 1 : 1,000,000, and at the end of the number a full-sized reproduction of the conventional signs and styles of type for the map, including the tints approved to indicate altitude.

THE KUMDAN GLACIERS IN 1902.

By Dr. SVEN HEDIN.

In August this year the Eleventh International Congress of Geologists will take place at Stockholm. One of the problems which will be thoroughly discussed by specialists from a great many countries is the climatic changes since the maximum of the last glacial epoch. Amongst other reports to be put before the members of the Congress there is one by G. E. Pilgrim, Assistant Superintendent, Geological Survey of India,

under the heading, "On the Changes of Climate in India during the Post-Glacial Portion of the Pleistocene."

In the June number of the *Geographical Journal*, I read with great interest the paper, which Dr. T. G. Longstaff gave before the Royal Geographical Society on April 18. Through his journey last year he has added much very valuable information about a little-known, or completely unknown part of those gigantic and most difficult mountains, called in Turki the Karakoram, or the "Black Gravel." At most of the glaciers he visited he found a more or less energetic advance of the ice, pointing to the fact that we are living in a period of augmented precipitation, and of more lively action in the Karakoram glaciers. The observations he has made, and the material he has brought back, will no doubt be of great interest, especially when compared with other records, chiefly from the western and eastern Himalaya; and from the point of view of accelerated activity of the ice his results will be of interest to the members of the Geological Congress.

It is, of course, extremely difficult, or rather impossible, to get exact measurements of the advance of the different glaciers in such a little-known, and seldom visited, part of the world as the Karakoram. Dr. Longstaff has done his very best to sift the historical evidence, and in the following pages I will add a few words to the recent history of the Kumdan glaciers.

Dr. Longstaff says: "These glaciers have been named from Turki sources by Captain D. G. Oliver, whose nomenclature is followed in these notes," and gives the names, Aktash, Kichik Kumdan, and Chong Kumdan; but I may mention that I used the very same names, from the same Turki sources, in 1902. In 1862, Ryall found the Kichik Kumdan at half a mile from the river, and seven years later Shaw reports that it completely blocked the road, which gives the unexpectedly rapid advance of some 110 metres a year. Only four years later Gordon easily made his way round the snout of the Kichik Kumdan. Oscillations of the ice are not at all surprising, but after all the possibility of a passage round the snout to a great extent depends upon the surface conditions both of the living and the dead ice.

I find the following passage in Dr. Longstaff's article: "Probably the last European caravan to traverse this route was that of Messrs. Church and Phelps, about 1894," and that in 1899 the progress of a planned road was arrested by the advance of the Kichik Kumdan. The first statement is not correct, as I travelled this route in April, 1902. However, it is also stated that "until the winter of 1902–3 traders continued to make use of the Kumdan route during the cold weather, passing round the snouts of the two Kumdan glaciers, by wading or fording when necessary." From this it seems that the winter 1901–2 was the last when the road was used, so much the more as "in the winter of 1902–3 the Kichik Kumdan advanced rapidly, and completely blocked the route." So I probably came at the very last moment to get a passage between the snout

of the Kichik Kumdan and the cliffs on the left bank of the river-bed. However, "wading and fording" is hardly necessary in the cold weather, when every bit of the river is covered with solid ice. Dr. Longstaff continues: "How rapid this advance was we do not know; Oliver was told that the glacier advanced several miles during that winter." This is absolutely impossible, unless the glacier began to travel up the very steep cliffs, but, as a matter of fact, the snouts are "stopped by the great cliffs of the left bank." In April, 1902, the easternmost part of the snout of the Kichik Kumdan was only 10 metres from the foot of the left bank cliffs. So the glacier could not possibly advance "several miles" during the next winter.

Dr. Longstaff could see the snout of the Kichik Kumdan from some little distance, and the description he gives of it proves that it had very much the same appearance in 1909 as in 1902. I found exactly the same "great masses of dead glacier-ice at the foot of the cliffs across the river" as he did. He estimated the greatest breadth of the expanded snout at about 2 miles. I got it to be 2½ miles, but as it was somewhat rounded I may have reckoned a bit of the sides to the snout, and 2 miles may be more correct. But, as I said before, it is very difficult to arrive at reliable conclusions from the information given by the natives, or even from maps or descriptions made by Europeans, who have not specially directed their attention to the glacial movements. The fact that the road in 1909 was blocked by all three glaciers seems, however, to be very eloquent. In the absence of more detailed data, Dr. Longstaff has used a very good method, *i.e.* by comparing photographs and sketches made at different times. The sketches General Gordon made in 1873 of the Kumdan and Remo glaciers were of great value for a comparison. When Captain Oliver photographed the Aktash glaciers in August, 1908, and returned in August, 1909, he was able to decide, "from the evidence of his own photographs, that the glacier had advanced a few yards since his previous visit." Probably Dr. Longstaff did not know that I had published seven photographs of the Kichik Kumdan, one from the right side of the glacier, another on the top of the glacier, and five (four of which are printed in heliogravure) from different points of the narrow passage between the glacier and the steep rocks on the left side. Those photos are published in my "Scientific Results," which are to be had in the Library of the Royal Geographical Society.* If new photos had been taken at the same places 7½ years later, very interesting conclusions should have been arrived at. When, for instance, in August, 1909, "the river had cut a channel" between the cliffs and the living glacier, and there was not even a suspicion of any such channel in April, 1902, as can easily be seen on my photos, this fact permits, *a priori*, the conclusion that the river every early summer breaks through the masses of dead ice, keeping the channel open till the late

* A very beautiful enlargement of one of my photos was published in the supplement to the *Graphic*, December, 1902. It gives a good idea of almost the whole narrow passage at the front of the Kichik Kumdan.

autumn, when the water begins to freeze, and again great blocks and pieces of dead glacier-ice fall down upon the river-ice. I admit there is another explanation possible. If the river is able to keep the channel open until the great cold sets in, the channel nowadays, very likely, may remain through the whole winter. But if this is the case, the glacier would seem to have advanced somewhat further, and to have been more powerful in 1902 than in 1909, which does not seem to be probable regarding the general advance of all the other glaciers as given by Dr. Longstaff. If I had an opportunity to see some photos taken in 1909 at the very same places as mine of 1902, I should at once be able to say whether the glacier had advanced or not. When I camped at Aktash I could hardly see the Aktash glaciers, as "they were enveloped in impenetrable clouds of whirling snow." But from Dr. Longstaff's excellent map and from his description they seem to have advanced considerably in 7½ years. Under such conditions it would seem very reasonable to conclude that it should have been the same with the Kichik Kumdan, the nearest neighbour of the Aktash. But then comes the question: Where in the world should the glacier get any place to advance, being already quite close upon the cliffs? The continued movement from above should still press the lower part of the ice stream downwards, and when the snout was hopelessly stopped by the rocks, the ice should be crushed to pieces, and form tremendous heaps of ice blocks, reminding us of the "torosses" in the pack-ice of polar seas, when two ice-fields, under the action of two different wind directions, are driven against each other. But of such a curious glacial phenomenon there is no trace in the description of 1909. And there is no trace either of the snout having been enlarged on account of the resistance it met in front, and the continued pressure of the ice masses from behind; and if there were such an accumulation of dead ice, there should, of course, be no place for a "river channel." I admit that the supposition of a greater precipitation in the "Firnmulde" of the Aktash than in that of the Kichik Kumdan is very unusual, and should be very difficult to account for.

When I passed the Kumdan glaciers on April 21, 1902, I was on my way back to Kashgar and Europe, and had a journey of three years in Eastern Turkestan and Tibet behind me. It was simply a retreat, as I was responsible for the safe return of my Turki servants, and specially of the Russian Cossacks. I was on well-known ground, and had finished my exploration work, and I was really longing to get home. I had got more than enough of travelling, and did not care very much for any Kumdan glaciers. My mapping of the road was superfluous, remembering all the British expeditions which had made so careful maps in these regions. So my observations on this section of the expedition were simply made *en passant*, and at a very unfavourable season, and cannot be compared in exactitude and detail with those made by Longstaff and Arthur Neve, who also are experts in mountaineering, which I am not.

However, these are the observations I made, and which have to be compared with the description we have recently got ; I start from my camp at Aktash :—

" At first we proceeded north-north-west on the right bank of the river, amongst a chaos of small hills and heights. The amount of snow in the bottom of the glen increased, but the quantity was not at all serious until we reached the vicinity of Yapchan. We passed close on our left a smaller glacier-arm, or, perhaps, only the end of a mantle-fringe ; then, after riding for a short distance across moraines of gravel and stones, we reached the edge of the vast glacier-arm of Kichik Kumdan, with reddish vertical cliffs on our right rising directly from the left bank of the river. We rode gently upwards, having on our left the glassy, glittering, flashing wall of ice. As the ice melted, the water dripped and ran down the face of the glacier, and the thousands of tiny rills gathered into a brook. It was no longer difficult to account for the muddiness of the Shyok stream, lower down ; for the glacier brooks carry with them glacial clay and mud from the bottom moraines. On sunny days the front of this glacier is exposed to the most active ablation, the consequence being that the surface of the ice is most irregular and broken, a confusion of cones and pyramids, with hollows, pits, and crevices between them. The smaller glacier-arms that we passed were relatively pure, although a banded structure is distinctly visible in them ; the larger ones contained all the greater amount of impurities and material brought down from the mountains higher up.

" We were now approaching the locality which we had been warned against in Shyok, as in some years rendering this route impassable. The most advanced frontal section of the Kichik Kumdan is pushed right across the glen until it encounters the precipitous rocky wall on the opposite or left side. Hence, in order to get past it, you have to climb partly over small, steep rocky heights and partly over a chaos of icy fragments, which have toppled down from the front of the glacier and form a veritable ice moraine, the separate pieces of which have become rounded on the outside through partial thawing. In some places they have cemented themselves together into a single compact mass, in which appear dark, gaping holes. At the time of our visit the true glacier front did not actually touch the opposite rocky wall. In consequence of the radiating heat, the melting of the ice was just at that spot intensified, and, in fact, there was a narrow passage left by which we were able to advance. It was, however, excessively contracted, sometimes only 10 metres across ; and it was perfectly plain that it needs but a slight increase in the glacial activity, such, for example, as one or two snowy winters followed by warm, bright weather, and this passage would be completely stopped, and it would be absolutely impossible to advance by that route. But the condition of things changes from year to year, and this is what our Ladakis meant when they said they could not guarantee that this route would be practicable that year. Had the passage been blocked by the ice, we should have been forced to make the three days' *détour* to which I have already alluded.* However, the road was open, though there was only just room for us to get past without lifting the loads off the horses ; and, strange to say, we succeeded without having a single leg broken in the deep holes that gaped between the ice and the fragments of rock.

* The eastern or Murgo route, which I travelled in December, 1907. It cannot possibly take three days more for caravans, as my Ladaki servants pretended in 1902. At any rate, it is longer and more difficult than the western road, provided this one is not blocked up by glaciers.

"After that we continued north-west up the glen, marching sometimes on the gravelly bottom, sometimes on the sheets of ice, until we came to the still bigger glacier-arms of the Chong Kumdan.* These do not, however, stop up the road, although there is but little room to spare, their front, abruptly broken, almost vertical, indeed, sometimes overhanging, is, in general, 20 metres high. The whole of the glen was here sheeted with ice, formed from the thaw-water. This glacier possesses far more moraines than the former, and a large portion of its arms is completely covered under grey detritus, through which the base rock projects here and there. The ground-moraine appears, however, to be more developed than the top or side moraines, so far, at least, as it was possible to judge from the front of the glacier. It is surprising that there exists no trace of any frontal moraine; but not even the smallest ridgelet of gravel is thrust forward by the ice. Yet such must inevitably be formed at times, though where they are forced by the pressure of the ice behind out into the middle of the rivulet that leaves the glacier, they are soon worn down and carried away by the water. From our route we were not able to see anything of the 'firn' region from which the ice-streams of the Kichik Kumdan and the Chong Kumdan are fed; we could not even see the tops of the glaciers themselves. Yet judging from the size of the glaciers in front, it is fair to infer that the gathering grounds of the ice must attain pretty large dimensions." †

Whether the advance of the glaciers depends upon changes in the glaciers themselves, as Dr. Longstaff is inclined to believe, or upon increase of the ice, one gets the impression from his report that most of the glaciers he visited are in a period of more lively activity. So, for example, it was said that the Chumik glacier had joined the Bilafond about fifteen years ago. At the snout of the Siachen glacier there were indications of an advance since 1862. At the Aktash and Kumdan glaciers perfectly certain proofs were believed to be found of an advance during the last years. It is quite sufficient to compare my description given above, with Dr. Longstaff's description of 1909. It seems also to be sufficient to remember that in 1902 a caravan did not meet with any difficulties worth mentioning, whereas in 1909 the route was completely blocked. The only question is: *How much* has the ice advanced? So much is evident, that the smaller glacier arm which I passed close to my left in 1902 is the same glacier which is called Aktash glacier on Dr. Longstaff's map, the snout of which he found "projecting into deep water; it terminated in a sheer wall of ice, round which we were quite unable to pass." Comparing these two

* The word Kumdan in Eastern Turkestan means "a brick-kiln." Chong means "great," and kichik "little." As I saw the Chong Kumdan from some distance, and the lowest, visible, part of the glacier was surrounded by very great moraines, except in front, and as the whole thing, both the naked ice and the moraines, was covered with snow, it was difficult to get an impression of the real dimensions of the glacier. To be certain, I marked on my map only those parts of the glacier about which there was no doubt that it was ice. On account of the medial and lateral moraines, I got the impression that the glacier went down in several arms, although I only marked one glacier on my map. I have drawn it too narrow, hardly 1 mile, whereas it was found in 1909 to be nearly 2.

† 'Scientific Results of a Journey in Central Asia,' vol. 4, 410 *seq.*

statements, it is impossible to say how much the snout has advanced, but it does not at all need to be much, as in winter, when the river is frozen, there would be no difficulty to pass the snout. The deep water of August has disappeared in winter, when the river presents an excellent road, especially if the ice is covered with some snow. In 1899, and subsequently, it was the Kichik Kumdan and not the Aktash that prevented the continuation of building a road.

However, at present the Aktash is also said to block the road. Of the Kichik Kumdan I have spoken above, and cannot find any considerable difference from 1902, although evidently the heaps of dead ice must be so accumulated, steep, and fantastic that no passage is possible. Even a mountain slip where great blocks of rock fill up a narrow valley, as I found between Kotaklik and Murgo in 1907, may be sufficient to close a road. Some gigantic blocks of ice, falling down in the narrow passage of the Kichik Kumdan, where I found a breadth of only 10 metres, would be quite sufficient to stop all caravans on the road between Yarkand and Leh, and such an occurrence could have happened in April, 1902, as easily as in the beginning of winter the same year.

As to the Chong Kumdan, I found that it did not yet stop up the road, which here followed the right bank of the river,[1] but the vertical ice wall stood quite close, about 30 or 40 metres from the river-bed. In 1909 the snout of this glacier "projected far into the river," but "we were unable to see whether any part of it reached the further bank." So here also we are left in uncertainty, as the answer to the question could be found only at the snouts, and these were impossible to travel round in the deep summer water of the Shyok. But we must also remember that in summer most of the bottom of the valley is filled with water, so that where in winter a passage is easy, it may be quite impossible in summer. I should not be surprised if the part of the bed, where I went on the right side of the river ice in April, was quite inundated by the Shyok in August. And if this be the case the absence of even the smallest front moraine is not at all surprising. Then the glacier brook is innocent for its disappearing, and it is, every early summer, swept away by the furious floods of the Shyok river.

I arrive at the following conclusions: (1) That observations made during the winter cannot directly be compared with observations made during the summer; (2) that the recent description seems to prove that the Aktash and Chong Kumdan glaciers have advanced a little bit during the last seven and a half years; (3) that I am not convinced of those two glaciers being the cause of the abandonment of the road; (4) that probably dead ice-blocks of the Kichik Kumdan filling the narrowest passage at its front are quite sufficient to make this road impossible for any caravans; (5) that it is absolutely impossible to judge about the glacial conditions at the snouts without visiting them, as from a distance, as a rule, it will look as if the glacier completely blocked the valley even if there is some

narrow passage left (see the upper photo on Plate 65, vol. 4, *op. cit.*); and finally, (6) that by help of fixed marks on solid rock near the Kumdan glaciers the rate of advance or retreat of the ice could be determined, if they were visited at intervals. These glaciers are easy to reach from Leh in winter, and an advance of them will probably mean an advance of all the glaciers in these parts of the Karakoram mountains, even if exceptional cases may occur, when one glacier is advancing, whereas his neighbour remains stationary. It may be that the Remo glacier is still more favourable, as there is a valley and not a rock wall in front of the snout.

The periodic oscillations of glaciers is one of the most fascinating problems of physical geography. It is interesting in itself, and very important on account of the light it throws on periodical climatic changes in general. Dr. Longstaff quotes from the Report of the Geological Survey of India, vol. 35, p. 135, the remarkable statement, based on native testimony, that the Hassanabad glacier recently advanced for two and a half months at a rate of over 5 metres an hour. Heim has calculated 0·217 to 0·687 metre a day for the Mer de Glace, 1·323 metres a day for the Glacier des Bossons, and 15·0 to 22·4 metres a day for the Jakobshavn glacier in Greenland, and Strachey calculated 2·0 to 3·7 miles for the glaciers in the Kumaon Himalayas. As an average for the year, Heim makes the speed of a glacier the same as the speed of the hour-hand of a pocket watch. It was a great and important thing when the Indian Survey, through the action of Mr. Douglas Freshfield and Lord Curzon, set about measuring typical glaciers in various parts of the Himalaya, the reports of which have already been published in two volumes. It is also very interesting to compare the advance Dr. Longstaff has noticed with the results published by the Commission Internationale des Glaciers, of which Mr. Freshfield is the English member. Those results are given in 'Les Variations Périodiques des Glaciers' for the year 1908. And, to make a long story short, we need only remember the following few words: "On voit clairment, en parcourant les rapports de 1908, que pour cette année encore le recul des glaciers a été un phénomène général," and further, "le recul des glaciers est un phénomène général sur le globe entier." For Asia, Mr. Freshfield quotes Mumm and Stein, who both have arrived at the conclusion that the glaciers are decreasing during later years. When now the reports from the whole Earth, the Alpes of Europe, the Pyrenees, North America, and Asia, with only some exceptions for Sweden and Norway, prove that the glaciers are in a state of general retreat, it is curious that the Karakoram glaciers should be advancing. This phenomenon no doubt demands a closer examination, although irregularities of this kind are by no means contrary to physical laws.

From Dr. Longstaff's description, I quite agree with him when he says that "the source of the Shyok is really the Remo glacier, and not

a small rivulet visible from near the foot of the Karakoram pass." When I passed the mouth of that valley, I could not see where the head branch of the Shyok river came from, as everything, the ice, the bottom of the valley, and the mountain slopes, disappeared under deep snow. I therefore only marked the opening of the Remo valley on my map. Sometimes it may be difficult to decide which branch of a river is to be called the source; but in this case there is not the least doubt that the Remo glacier is the source of the Shyok. It is the same hydrographical situation as in the case of the Brahmaputra, where the westernmost glacier in the Kubi-gangri is the source, and not any one of the rivers coming from the Tamlung-la, or Marium-la, although their absolute altitude is higher than the front of the Brahmaputra glacier.

The absolute altitudes of Dr. Longstaff seem to be a little too low. I do not judge from Yapchan, which he places at 15,700 feet, whereas I found 16,030, because it all depends upon the very place where the observation is made. For the pass north-east of Kisil-unkur (" the red ravine ") he gives 17,000 to 18,000. I found 17,800. On the Karakoram pass we get a point of certain comparison. He gives 18,110 feet, whereas I found 18,560. Colonel Burrard has 18,550.

The paper of Dr. Longstaff has the title, " Glacier Exploration in the Eastern Karakoram," and the same title, " Eastern Karakoram," is given to the map. I do not mind Karakoram being written as one word, although Kara Koram should be more correct, as we write Hindu Kush, Kwen Lun, Arka Tagh, or Kichik Kumdan. I write Kara-korum. But the term *Eastern* Karakoram for the part of the system situated between 76½° and 78° I regard as perfectly wrong. Colonel Burrard says, " The Karakoram and Hindu Kush ranges of mountains are different sections of the same crustal fold. . . . The eastern portion of the fold is known as the Karakoram range, the western portion as the Hindu Kush. . . . The western termination of the Karakoram is the Hindu Kush, but of its eastern termination we know nothing." *

During my last expedition I crossed the Chang-lung jogma (18,960 feet), which is on the Karakoram at 79°, and from where the system can be seen stretching south-east as far as the eye reaches. The whole orography of the country proves that this pass is situated in the Karakoram range. South-east of Aru-tso I went over a pass at an altitude of 18,550 feet, of which I am pretty certain that it is situated on the same crustal fold as the Karakoram pass and the Chang-lung-jogma, that is to say, the system can be followed to 83°. On the other hand, it is only conjecture when I say that I believe the Karakoram range continues through the whole of Tibet, almost as distinctly as Kwen-lun and the other great systems. And I believe that a more detailed knowledge in the future will prove that Abbé Huc's famous Tang-la range is the eastern continuation of the

* 'A Sketch of the Geography and Geology of the Himalaya Mountains and Tibet,' pp. 98, 99.

Karakoram. Already in 1905 I was convinced of this, as can be seen on Plate 69, vol. 4, of my "Scientific Results," although I then made the mistake to place the range to the north of the Aru-tso. On Colonel Burrard's frontispiece map the Karakoram is sketched through the whole of Tibet, although I believe its central and eastern part has been placed a little too far to the south.

But this does not at all interfere with the matter in question, as the certain knowledge we already have of the Karakoram is sufficient for calling the part of the system, which is situated between the Hindu Kush in the west, and the British frontier in the east, the *Western Karakoram*, and from there further to the south-east and east, the *Eastern Karakoram*. Under no conditions should the part between 76½° and 78° be called the Eastern Karakoram, and in this I am sure Colonel Burrard will agree with me, as I agree with him, that the name Muztagh (Mus-tagh) for the westernmost part of the Karakoram range has to disappear for ever.

The little sketch-map given by Dr. Longstaff on p. 625 of the *Geographical Journal* is very interesting, and sheds new light upon a most important orographical and hydrogeographical problem. So far as I can see, the range with the Karakoram pass, the Teram Kangri, the Gusherbrum, and the Mus-tagh pass, that is to say, the Ka akoram range *par préférence*, is the continental watershed between Lop-nor and the Arabian sea. From this range the Sayok river, with its tributaries, as well as the Shigur river, etc., begin and break in transverse valleys (Durchgangstäler) through the southern range. Of this range Dr. Arthur Neve wrote to me some time ago: "It may be interesting to mention that, in my opinion, the old names Mustagh or Karakorum range apply only to the northern range of the British Indian frontier, *i.e.* from the Karakorum to the Mustagh pass, and that there is a southern range, represented by the Saser peaks, Saltoro pass, K^{10-11}, Masherbrum, and range south of the Baltoro, Biafo, and Hispar glaciers. Following your lead, I propose Trans-Shayok as a name for this range, for lack of a better."

In connection with Dr. Neve's proposal, which I think is an excellent one, I will only mention that in many parts of High Asia our orographical knowledge has increased so much during later years, that the time is approaching when proper and practical names have definitely to be given to different ranges. Herr H. Habenicht, of Gotha, has suggested to me the name of Ryder range for the range situated to the north of the upper Brahmaputra, and I am only too happy to accept it. I regard the Ryder range as stre ching between the eastern end of the Kanchung-gangri in the west, and the Ki-chu of Lhasa in the east. The range bordering the very uppermost part of the upper Brahmaputra, say from Cha-chu to Kailas, I should like to call the Strachey range, and the range from the Kailas along the upper Indus the Montgomerie range. But all these are

mere suggestions which have to be submitted to the Survey of India and the Royal Geographical Society, and unless they are approved I am not going to use the new names. As a rule I hate European names on Asiatic maps. Wherever native names are to be found, no other should ever be used. But in some cases, and for lack of native names, it may be useful and practical to introduce exotic ones. And as far as Tibet is concerned, no names have a greater right to appear on the map than those of Montgomerie, Strachey, and Ryder.

THE TONGUE OF THE HASANABAD GLACIER IN 1908.

By WILLIAM HUNTER WORKMAN, M.A., M.D.

In the 'Records of the Geological Survey of India,' vol. 35, p. 135, Mr. H. H. Hayden calls attention to the story of the rapid advance of the Hasanabad glacier, which he obtained from the Mir and the Wazir of Hunza, according to which the glacier advanced several miles in the course of two and a half months, though it was said to be stationary when he observed its tongue in August, 1906. It was also said to have made a similar advance on a former occasion, of which the time was not specified, after which it retreated rapidly.

In the course of the expedition of Mrs. Bullock Workman and myself to the Hispar region in the summer of 1908, before reaching Nagar we camped at Dadimal, about 6 miles distant from the Hasanabad nala. Being so near to it, I decided to devote a day to a visit to the tongue of the Hasanabad glacier, to see whether any change had occurred in its position or condition since Mr. Hayden had observed it two years previously. Accordingly, accompanied by a servant and a coolie to carry my instruments, I started early the next morning to walk the 6 miles that lay between our camp and it.

On my arrival at the mouth of the nala about 10 a.m., I was met by the Wazir of Hunza, the medical officer of the Aliabad Dispensary, and a dozen attendants, despatched by the Mir of Hunza to take me in charge and conduct me to Mr. Hayden's stations. They presented the Mir's compliments, together with a cordial invitation to our party to visit Hunza, of which, owing to other arrangements, we were unable to avail ourselves.

After I had rested a short time, and quenched my thirst from a basket of delicious mulberries the Mir had thoughtfully sent over, the whole party went up the nala to the tongue of the glacier, first visiting Mr. Hayden's first station, just west of the extremity of the tongue. This was a huge granite boulder, with Mr. Hayden's inscription upon it in black letters as fresh and bright as if made the preceding day.

We climbed to the top of the boulder, which was large enough to accommodate several persons. From here, station 2, marked on the

rock-face of the mountain-wall opposite on the east side of the nala, could easily be seen, and the lettering on it read with the field-glass. A tripod was set up at the central point of the boulder-top, for use in sighting and photographing. A line sighted from this to station 2 passed directly over the extremity of the tongue, thus showing that, at the end of two years that had elapsed since Mr. Hayden's observation, the tongue remained in the exact position in which he found it. There was also no evidence, from the *débris* at the extremity, that it had moved either way during that time, one of my photographs of this portion being an almost exact reproduction of Mr. Hayden's, even the same boulders and *débris*-formations being seen in both. In other respects the tongue was not essentially altered in its appearance as shown in Mr. Hayden's admirable photographs.

The steep, rough talus leading up to the Gamkin irrigation-canal, above which Mr. Hayden's station 3 was located, was next ascended, and the spot found where the boulder forming the station had rested, but the boulder itself was not there. It had slid down the slope to a point, below the canal, some 60 feet from its former position, where it was lying partially embedded in sand. Photographs were taken from here, as well as from station 1. The inspection being completed, the party returned to the mouth of the nala. The Wazir added nothing to the statements previously made about the glacial movement. We bade one another adieu about noon, after which I returned to Dadimal. The day was warm, the solar thermometer at 12.30 indicating 196·5° Fahr.

I am not aware that the Hasanabad glacier has ever been explored by a European, or that its length is known. Its nala, as far as I could see into it, is narrow, and high snow-peaks tower above its upper portion. If, as seems probable, its length is not great, and its reservoir is large as compared with the size of the trunk, and the mountains enclosing its upper end descend sharply to it, a season or two of heavy snowfall would be likely to cause such an accumulation of snow in the reservoir as might easily induce a sudden augmentation of pressure, which would drive the trunk rapidly down the narrow nala.

The last rapid advance would appear from the account to have taken place in the summer of 1903, after the stormy seasons of 1902 and 1903 in this region, when I also noticed a similar advance of a large branch of the Chogo Lungma descending sharply from the snowy Haramash mountains, which crowded the Chogo Lungma trunk bodily over for a considerable distance against its left laternal moraines, from which, in 1902, it stood well removed. The same cause might have been active on the former occasion, when the Hasanabad glacier advanced, and then retreated quickly. If the conditions I have mentioned as probable are the ones actually existing, an equilibrium of pressure having been established by the advance after stormy seasons, in succeeding seasons, without unusual or with less than the average snowfall, the tongue, being thus

freed from further pressure, would not only cease to advance, but might melt rapidly away and retreat up the nala again, as it is said to have done after the first advance.

I made another observation of interest in connection with the Hasanabad glacier. The soil of the district for several miles around the opening of the Hasanabad nala is saturated with sulphate salts, which whiten the surface and impregnate all the water, making it bitter and unpalatable, as well as, physiologically, unwholesome. We were unable to use the water for either drinking or cooking for several days till Nagar was left behind, though the inhabitants appear not to be inconvenienced by it.

While examining the ice-cave of the Hasanabad glacier, with considerable difficulty, I managed to filter with a Berkefeld filter enough of the mud-laden water of the stream issuing from it to fill my two-quart water-flask, thereby obtaining a water of crystal clearness, that, as tested by its taste, appeared to be as pure as any spring-water I have ever met with, and certainly was free from the suspicion of containing salts of any description. The presumption is, therefore, that the rocks of the mountains enclosing the Hasanabad nala are different from those of a large district around it, at any rate, as regards the presence of sulphates in their composition.

CANOE ROUTES FROM LAKE SUPERIOR TO THE WESTWARD.

By LAWRENCE J. BURPEE, F.R.G.S.*

In the broad field of geographical investigation offered by this continent of North America, no more fascinating study will be found than that of its far-spreading river systems. The rivers of North America are not merely interesting for their own sake, but because of their intimate connection with the exploration and development of the continent. Their names conjure up a thousand stories of pluck, endurance, and heroic endeavour. Their waters have borne the varied craft of explorers and fur-traders, missionaries, and pioneers. They have been the highways of war and peace; their banks have echoed to the yells of Indian warriors, and the songs of French *voyageurs*. They have seen the marvellous transformation of this new world, from a boundless wilderness, tenanted by scattered tribes of savages, to the home of a hundred millions of white people. In themselves, they present perhaps the most remarkable system of waterways in the world. They afford communication with every quarter of North America. It is not merely theoretically true, but it has borne the test of actual experience, that a man might set out in a birchbark canoe from Winnipeg, and with nothing more than a few practicable portages, make his way east to the Gulf of St. Lawrence, west to the mouth of the Columbia, north to Hudson bay or the Arctic, or south to the Gulf of Mexico.

Knowing the important part played by the rivers of North America, as avenues of transportation, particularly in the early history of the continent, it is not difficult to realize the vital significance of the portages. These well-worn paths over the height of land were the essential links in the network of rivers; and the discovery of a practicable portage was of scarcely less importance than the discovery of a great

* Read at Section E of the British Association, Winnipeg, August, 1909.

river-system. The object of the present paper is to give a brief account of a single group of portages—connecting Lake Superior with the Lake of the Woods and Lake Winnipeg.

Up to the middle of the seventeenth century, no white man is known to have reached the western end of Lake Superior. In 1661, however, two French explorers from Canada, Pierre Esprit Radisson and Médard Chouart, coasted the south shore of the lake to Chagouamigon bay, and wintered among the Sioux of Mille Lacs, in what is now the State of Minnesota. The following spring they returned to Lake Superior, crossed the foot of the lake, and paddled along the north or northwestern shore. Their subsequent adventures, which have been the subject of violent controversy, do not concern us here. Sixteen or seventeen years later, Daniel Greysolon, Sieur Du Lhut, went to the head of Lake Superior, and, after wintering with the Sioux, made his way by water to the Mississippi.

It was not, however, until 1688, that any attempt was made to explore the waterways leading from Lake Superior to Lake Winnipeg. In that year, Jacques de Noyon, of Three Rivers, reached the mouth of the Kaministikwia river, and, learning from the Indians of a water-route that, as they said, would bring him to the long-sought shores of the western sea, determined to make the discovery. So far as is known, he left no narrative of his journey, but a description of the route that he followed is contained in a memoir of the Intendant Begon, dated November 12, 1716. Leaving Lake Superior, he entered the Kaministikwia river (or Gamanistigouen, as it is called in the memoir), and ascended it for 10 leagues, to a portage of ten arpents. A series of rapids brought him to a long portage called the *Portage du Chien*, or Great Dog Portage. Passing through what is now known as Dog lake, he entered Dog river. Following that stream for 15 leagues another portage brought him into a small lake at the height of land, now called Height of Land lake. It is described as about ten arpents wide. At the end of this lake, he portaged into a swamp; thence into a small stream, down which he paddled for 10 leagues, and reached Canoe lake (now Lac des Mille Lacs). Six leagues brought him to a portage through a point of trembling poplars, to a small stream (Seine river) full of wild rice, or wild oats, as it was then called. Down this stream he paddled for two days, making about 10 leagues a day, to a waterfall (Sturgeon fall), where a short portage brought him into a lake 3 leagues long, at whose western end there was a rocky strait, opening into the lake of the Crists or Cristinaux, now known as Rainy lake. This is described in the memoir as about 8 leagues long. At the western end of this lake, or on the banks of the Takamimouez or Ouchichig river (Rainy river), he wintered with a party of Assiniboines.

The Assiniboines offered to conduct De Noyon in the spring to the Western sea, where they were going, they said, on a war expedition to the number of one hundred, to fight a nation of dwarfs, described as 3½ or 4 feet high, and very stout. The Indians, never lacking in imagination, told De Noyon of fortified towns and villages where the men were white and bearded, and rode on horseback with the women behind. They spoke of ships that fired big guns, of a city with walls of stone, and of many other wonderful things. All this they told de Noyon, or he thought they told him, which perhaps is nearer the truth. The wish was father to the thought, and the imagination of the Indians may have been spurred by his eager suggestions.

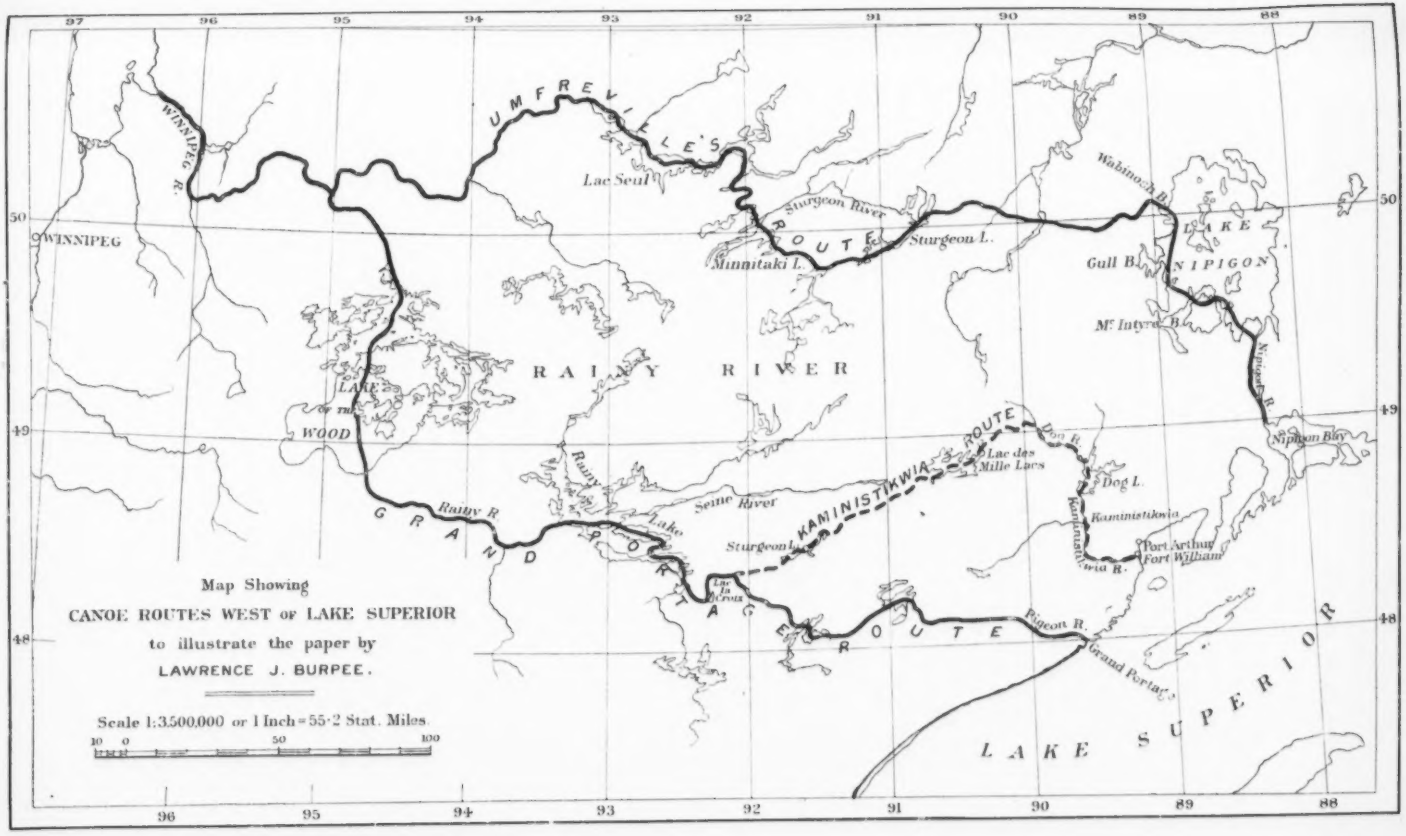
De Noyon did not accompany the Assiniboines to the Western sea, but he evidently went with them as far as Lac des Assiniboiles, or the Lake of the Woods. This is proved by the memoir of Begon, which gives a detailed description of the route. "We follow the Ouchichig river," says Begon, "for six days, making about 80 leagues, without any rapids. About 2 leagues after entering the river, there is a fall (Choudière) where a small portage is required, and there are also two other

small falls (Manitou and Long Sault) where portages must also be made, and then we come to Lac aux Iles, otherwise called Assiniboiles or people of the Black stone, which is of 500 leagues circumference. On entering this lake to the left, the country is barren, and on the right hand it is furnished with all kinds of trees, and it is filled with many islands. At the end of this lake, there is a river emptying into the Western sea, according to the report of the Indians." The river last mentioned is evidently Winnipeg river, and consequently the "Western Sea" is Lake Winnipeg. The Assiniboines had told De Noyon that at the mouth of this river, the water rose and fell. Where so much was fiction, no particular weight need be attached to such a statement. However, in this case the Indians probably described what they had seen, as one finds constant references in the narratives of later travellers to this curious phenomena. La Vérendrye was deceived by a similar statement made to him by the Indian Ochagach. Keating, the American traveller, explains the phenomena as the result of a high wind blowing the waters of the lake into Traverse bay and piling them up the river. He confesses that, had he not been aware of the cause of this local rise, he might readily have mistaken it for the effect of a regular or periodical movement, which it very much resembled. As a matter of fact, the lake always rises and falls in a change from northerly to southerly winds.

De Noyon's discovery had no immediate results. It was not, in fact, until 1717 that any attempt was made to follow it up, so far as the records show. In that year Lieut. Zacharie Robutel de la Noüe was sent by the governor, De Vaudreuil, to establish a post at Kaministikwia, and there is some reason to believe that about the same time he also built a post on Rainy lake, following no doubt the route discovered by De Noyon.

Five years later we hear, for the first time, of another canoe route to the westward from Lake Superior. An officer named Pachot writes urging the establishment of a post at Tekkamamiouen (one of the many variants of the Indian name for Rainy lake). This, by the way, seems to throw doubt upon the probability of La Noüe having already built a post on that lake. However, the interesting point in Pachot's letter is this: "The best route," he says, "to go to the proposed establishment (on Rainy lake) would be by a small river named the Neutokaogane (or Nantokouagane) which is about 7 leagues from Kaministigoya." This is evidently Pigeon river, and the route the afterward famous grand portage route.

In 1731, the first determined effort to penetrate the country to the westward of Lake Superior was made by Pierre Gaultier de Varennes, Sieur de la Vérendrye—one of the greatest, most persevering, and most unselfish of western explorers. La Vérendrye reached Grand Portage in August, 1731, with his three sons, his nephew La Jemeraye, and a party of soldiers and *voyageurs*. The men had been tampered with by La Vérendrye's enemies, and refused to cross the portage. La Vérendrye was therefore forced to winter at Kaministikwia, while his nephew with a few loyal followers went west to Rainy lake, where they built Fort St. Pierre. The route is briefly described in a letter to the governor, Beauharnois, dated October 19, 1732. There are, he says, forty-seven portages to be made in going from Lake Superior to Takamamiouen, or Rainy lake. He learns, however, from La Vérendrye, of another route to the north of that followed, which involved only nine portages, and was believed to be more practicable. In a further letter, dated October 8, 1734, Beauharnois reports a conversation with La Vérendrye on these routes. The more northerly route proved on investigation to be unsatisfactory, as it added 120 leagues to the journey, and moreover it was so shallow that eight-seat canoes could not be taken through without great difficulty. La Vérendrye had therefore decided to stick to the first route. Here he had employed his men for some time in improving the navigation, and had succeeded in reducing the portages to thirty-two. He had



Map Showing
CANOE ROUTES WEST OF LAKE SUPERIOR
to illustrate the paper by
LAWRENCE J. BURPEE.

Scale 1:3,500,000 or 1 Inch = 55·2 Stat. Miles.

10 0 50 100

also cleared the portage paths, so that seven could be made in a day. Thus, as he says, he had been able to reduce the wages of his *engagés* from 500 livres, which they had formerly demanded because of the hardships of the portages, to not more than 250 or 300 livres. It is not certain if the more northerly route mentioned by La Vérendrye was the Kaministikwia route discovered by De Noyon, or one of the several variants of the Grand Portage route. La Vérendrye makes no mention in any of his letters or memoirs of the explorations of De Noyon or La Noüe, and it seems clear that he knew nothing of them. Indeed, in studying this period of western discovery, one is struck by the fact that each of the French explorers worked independently, without availing himself of the results of previous explorations, if indeed they had ever come to his knowledge.

Here, at any rate, we have two fairly well-defined routes from Lake Superior to Rainy lake: one by way of the Kaministikwia river and its connecting waterways, and the other over Grand Portage and through a series of small lakes and streams lying along what is now the International boundary.

It is not known when the first English traders entered the North-West from Lake Superior, but there is evidence that it was before 1767, and that they went in by way of the Grand Portage. In the Journal of Matthew Cocking, of the Hudson's Bay Company, 1772–73, it is mentioned that one, Mr. Finley, of Montreal, occupied a trading post on the Saskatchewan river five years before, that is, in 1767. Cocking also mentions a Mr. Curry, who was trading on the Saskatchewan in 1772, and probably for some years earlier. These were, no doubt, the James Finley and Thomas Curry referred to in Alexander Mackenzie's 'General History of the Fur Trade,' as the pioneer English traders from Canada in the North-West. Both Mackenzie's 'History' and Carver's 'Travels' make it clear that these early traders followed the Grand Portage route. Carver, who visited Grand Portage in July, 1767, says: "Here those who go to the north-west trade, to the Lakes De Piuye (Rainy lake), Dubois (Lake of the Woods), etc., carry over their canoes and baggage about 9 miles, till they come to a number of small lakes, the waters of some of which descend into Lake Superior, and others into the river Bourbon."

The first detailed description of the Grand Portage Route is that of Alexander Henry, in his 'Travels and Adventures in Canada and the Indian Territories, 1760–76.' Henry reached the Grand Portage in June, 1775, and found the rival traders there in a state of "extreme reciprocal hostility." When he tells us that the transportation of the trading goods over the Grand Portage, which was merely the first of a long series of carrying-places, was a work of seven days of severe and dangerous exertion, we can understand why La Vérendrye's men demanded such heavy wages for their work.

This Grand Portage route continued to be used by the independent traders from Montreal, and afterward by the North-West Company, until the end of the eighteenth century, when it was abandoned for the Kaministikwia route. The history of the re-opening of the original route discovered by De Noyon is somewhat curious. Toward the end of the century, it having been found that Grand Portage, up to this time the principal establishment of the North-West Company, was on American territory, a determined effort was made to discover another route farther north. Edward Umfreville was sent to explore the country west of Lake Nipigon, in 1784, and actually found a practicable route, which will be referred to presently. In 1798, however, Roderick MeKenzie, returning to Grand Portage from the west, accidentally learned from a party of Indians of a water communication leading from Lake St. Croix to the mouth of the Kaministikwia. He followed it to Lake Superior, and, as a result, the North-West Company moved its establishment from Grand Portage to the mouth of the Kaministikwia, where Fort William

was built, in 1801. Up to the time of Roderick McKenzie's discovery, or re-discovery, of the Kaministikwia route, it seems to have been unknown to the North-West Company. And yet Roderick McKenzie's famous cousin, Alexander McKenzie, clearly describes it in his 'General History of the Fur Trade,' in speaking of Lake La Croix. "Into the East bay," he says, "is a road which was frequented by the French, and followed through lakes and rivers until they came to Lake Superior, by the river Caministiquia, 30 miles east of the Grande Portage." The Kaministikwia route is also clearly shown on the manuscript map of Peter Pond (1789), in the Dominion archives. An explanation of the apparent ignorance of the North-West Company may perhaps be found in the fact that both Alexander McKenzie and Peter Pond were members of the rival X Y Company, which was not absorbed by the North-West Company until 1804.

Having briefly described the history of the Kaministikwia and Grand Portage routes, it remains to say a few words about the third route, by way of Lake Nipigon, discovered by Umfreville in 1784. Umfreville left Pays Plat, at the eastern end of Nipigon bay, on June 16, and entered Nipigon river the same evening. He had with him a small party of men, in a light canoe, and was able to make good time. On the 19th they entered Nipigon lake, by way of Flat Rock portage, crossed Three Mountain bay, and the head of McIntyre bay, and by way of Boggy portage came to Ingall point. From here they went west around Caribou island to the west shore of the lake, where, in lat. 49° 42', as Umfreville made it, they found traces of the old French forts, perhaps built by Dulhut in the previous century, or where La Vérendrye may have been stationed when he learned from the Indian Ochagach of the road that led to the "Western sea."

Umfreville had had trouble with his Indian guides, especially one whom he picked up at the foot of the lake, and who had promised to guide him to Portage de l'Isle. This man belonged to Sturgeon lake, and remembered seeing Umfreville at Fort Severn when the latter was in the employ of the Hudson's Bay Company. This did not prevent him, however, from a course of petty thievings, culminating in the robbery of a nine-gallon keg of liquor, which he secreted in the woods, but which was accidentally discovered. "I enticed him to the place," says Umfreville, "by telling him I had found the fresh track of a moose. He came very unsuspectingly, but great was his surprise when I showed him the keg of liquor. After upbraiding him with his perfidy, I obliged him to carry the keg back to camp." Umfreville would willingly have sent him off, but no one else knew anything of the route to be followed. "Nothing but absolute necessity," he writes feelingly in his journal, "would induce one to have anything to do with a man possessed of every bad quality, and whose mind is as black as his skin."

From the ruins of the old French fort, the party coasted north, crossing the entrance to Gull bay, which they mistook for a river, and over West bay to "a lofty peak of perpendicular rocks." They passed the site of another old French fort, and also "a remarkable round island of high land." This last was no doubt Jackfish island, with Mount Royal; and the old fort must have stood not far from the present Nipigon House of the H.B. Company. Crossing English bay, and rounding the point, they entered Wabinosh bay, landing on an island "very high and shaped like a barn," no doubt the same now known as Inner Barn island. At the bottom of Wabinosh bay they found the river they sought, which they had learned from the Indians would furnish a route to the west. After a couple of miles' paddling and dragging up this small stream, they entered Wabinosh lake, followed by a motley crowd of Indians with their families and baggage, picked up on the way across Lake Nipigon. Among these Umfreville sought diligently for a competent guide, but without success. He must still depend upon the thieving good-for-

nothing gentleman from Sturgeon lake, who fully realized that he controlled the situation. "This fellow," wails Umfreville, "possesses all the duplicity of the devil. One day he knows the way better than any Indian in the country. The next day he knows nothing about it. At one time he is ready to do us any service, and soon after will threaten our lives; but our situation is such we must accept of him or give up the journey." His increasing insolence, however, determined Umfreville to get rid of him at all costs, and to remain at Wabinosh lake until chance should send another guide. Fortune favoured him, for he learned from a passing trader of a guide who could at least take him as far as Sturgeon lake. This man was sent for, and a satisfactory agreement having been reached, the party once more set out on their exploration. Before leaving Wabinosh lake Umfreville made his position to be lat. 50° 2′.

As far as Obonga lake, Umfreville's course is clear, but beyond that it is more difficult to follow him. Later indications, however, make it practically certain that from Obonga lake his course was through what it is to-day an unexplored district, to Seseganaga lake, and thence to Sturgeon lake, which he reached July 10. From here two routes were available to Lac Seul, one leading out of the upper, and the other out of the lower, end of Sturgeon lake. The guide had promised to lead Umfreville to what he calls La Chemin Neuve, which was by way of Sturgeon river, but missed the entrance. The party therefore proceeded to the south-western end, where what was apparently the old route, led west and north-west to Minnitaki lake and Lac Seul. Umfreville reached Minnitaki, or Monataggé, as he has it, July 13, and Lac Seul two days later. Near the entrance he passed a rock in the lake called Roche du Diable, which he says was reverenced by the Indians, who had "deposited several things as presents to the Old Gentleman." He also passed an old establishment made by a Mr. Lyons some years before, where a considerable trade had been carried on with the Indians. The guide told him that from this lake it was not more than three days' paddling to Henley house, and five to Albany fort, on Hudson bay.

A day was lost on the lake, trading with a party of Indians for provisions, but the worst part of the journey was now over, and it was comparatively easy going from Lac Seul to Winnipeg river. Umfreville found the position of his camp, near the western end of Lac Seul, to be lat. 50° 22′. The following morning when he embarked, he found to his disgust that the wife of the guide was drunk, and would not enter the canoe. The consequent loss of a fine day's travelling leads him to some interesting reflections on the folly of carrying spirits on a voyage of exploration. "An Indian," he remarks, "may be as meek as a lamb when sober, and the same man when drunk a mere devil." All his troubles by the way he attributes to "this infernal stimulator." He adds, however, with charming *naïveté*, "were we on a trading voyage, I own the necessity of it."

After an uneventful journey down the English river, Umfreville reached Winnipeg river, and his destination, Portage de l'Isle, July 23, having been thirty-eight days on the way. The narrative of his journey is preserved in the archives of McGill University.

Umfreville had demonstrated the existence of a practicable route by way of Lake Nipigon, but the North-West Company hesitated to adopt such a roundabout road, except as a last resort, and when Roderick McKenzie found the Kaministikwia waterway, all thought of utilizing that by way of Lake Nipigon was abandoned. The Kaministikwia route was used thereafter as the thoroughfare from Lake Superior to the west, until the waning fortunes of the fur trade, and the building of roads and railways, made it no longer necessary.

THE SCIENTIFIC WORK OF THE BRITISH ANTARCTIC EXPEDITION OF 1907–9.*

By JAMES MURRAY.

THE address dealt with the more important results obtained in geology, biology, and physics. In geology the greatest value attaches to the small collection of rocks brought by Sir Ernest Shackleton from a high latitude. Among these were coal and other organic vestiges. Should it prove possible to determine the horizon of any of these, an important step will be made in tracing the history of this part of the Antarctic continent. The study of a piece of coniferous wood from 85° S. lat. leads Prof. David to suggest that the Beacon Sandstone formation is of Lower Carboniferous or Upper Devonian age.

The problem of the Great Ice Barrier is now practically solved by the observations of this expedition, supplementing those made by Captain Scott. On the voyage south to Victoria Land it was noticed that the familiar tabular bergs showed no solid ice, except where the wash of the sea had made a crust. They appeared to consist entirely of compressed snow. Measurements of overturned bergs showed that they had floated very high, some showing as much as one-fifth, or even one-fourth, of the total height above the old water-mark. Subsequently the officers of the *Nimrod* made soundings round a grounded berg, and found that the portions above and below water were about equal. No ice was seen in the overturned bergs. The face of the barrier, like the bergs, showed only compressed snow in horizontal strata.

Joyce's depôt party were fortunate enough to locate an old depôt laid down by Captain Scott on known bearings, and were thus enabled to determine the rate of travel of the Barrier near its western edge, and the rate of accumulation of snow on the surface, over a period of more than six years. The movement seaward was at the rate of about 500 yards per annum, and the accumulation of drift about 1 foot per annum.

Although it appeared to be a level plain where these measurements were made, it must be supposed that the drift varies greatly at different places, and no doubt the rate of travel would be different in the central region remote from land. If these data are used as the basis of a rough estimate of the rates of travel and depression, it will appear that the layers of snow at the base of the Barrier face, where it is about 200 feet in height, must have fallen on the surface some 50 miles further south, 200 years ago. Yet under this great weight of overlying snow the lower layers are not changed into ice. Ordinary valley glaciers debouch on the Barrier at various points, one of them affording the highway towards the pole. From all these facts the history of the Great Barrier can be pieced out.

Originating in the glaciers which enter the contracted sea between Victoria Land and King Edward Land, the ice floats off and is driven northward, becoming gradually more and more depressed under the accumulating snow till it is beneath sea-level. Probably ere it reaches the Barrier edge the ice may be entirely thawed away by the action of the sea-water, leaving only the floating snow-sheet.

The surfaces of the lakes are often covered by a peculiar friable kind of ice, which we called "prismatic" ice, as it consisted of vertical prisms. This might be derived from snow, or from other forms of ice. Under the influence of changes of temperature, sun, and perhaps other factors, the surface of a snow drift, or of a heap of irregular chips of ice, has been observed gradually developing this

* Summary of Address at the Royal Society of Edinburgh, February, 1910.

secondary structure of vertical prisms, while the deeper layers retained the original structure.

The vertical prisms or fibres of the sea-ice are very evident in the newest stratum, which is exposed when trenches are opened for the purpose of dredging. Cracks which open in cold weather are quickly filled by new ice in the form of horizontal prisms, which grow out at right angles to the edges of the floe till they meet in the middle. Where a crack bends abruptly curved fibres are built up in adjustment to the contending influences of the two sides of the bend.

That the glaciation of the region is diminishing, or at least that it is less now than at a former period, is indicated by the extensive morainic deposits which are seen on the shores of Macmurdo sound. Erratics have been traced to a height of over 1000 feet on Mount Erebus, and the summit of Mount Hope, 2000 feet above the present level of the Barrier, is strewn with them. These facts need not, however, be taken to indicate that the ice ever stood as much as that above sea-level, as there are evidences of quite recent elevation of the land, to the extent of some hundreds of feet, and the elevation may have been much greater, though the traces of it be lost.

The receding of the Barrier since Ross visited it, the moderate snowfall, and the numerous dead glaciers point to diminishing glaciation at the present day. The elevation of the land is evidenced by many deposits consisting of recent marine organisms.

Near our camp there is a small deposit containing fragments of serpulæ, and another consisting chiefly of the spicules of siliceous sponges, making a soft felted mass 8 feet thick, in which are included many shells of molluscs and other organisms. At the mouth of the valley occupied by the Ferrar glacier, and far north near Mount Larsen, there are other deposits of recent marine organisms. At Hut Point little felted balls of sponge spicules were found lying loose on the ground, no doubt derived from some local deposit. Some of these beds occupy mounds, as though they were fragments of an extensive sheet now in great part denuded away. It is a curious fact that at some places these fossiliferous beds overlie strata of ice.

At the bottom of Coast lake there were found layers of a peat-like deposit interstratified with layers of ice. These may be accounted for by supposing that a number of recent summers have been successively colder, so that each year the summer thaw penetrated to a less depth. Only the very shallow lakes melted during the summers when we were there. The deeper ones did not melt at all, or merely had a little thaw-water on the surface in the neighbourhood of black rocks exposed to the sun.

The earth-shadow, or aërial shadow, is a familiar Antarctic phenomenon. The shadows of peaks, projected through the apparently clear atmosphere, can be seen, on account of the presence of minute particles of ice, as long tapering dark bars. Sometimes they appear curved. The shadow of Mount Erebus, projected over Macmurdo sound on to the foothills of Mount Lister, and easily recognized, when cast upon the snow, by the shape of the steam-cloud, could be traced all the way as a line making an arc of circle, which on one occasion rose apparently 30° above the horizon. The observer was looking in a direction transverse to that of the rays of light at the moment, and was within the shadow of the mountain. They also appeared curved when the observer was entirely outside the shadow. Thus when the sun got round so that Cape Royds was in sunshine in the mornings, the shadow of Erebus could still be seen, taking an apparently curved course over Castle rock and falling on the ice in the sound outside Hut Point.

Continuous tidal observations were got over a period of some months by means of

an apparatus of which the recording part was an ordinary barograph drum, the scale being reduced by means of a long lever. Besides the tides the record indicated seiche oscillations. The scale of the recorded curve was so small that the seiche festooning was blurred, but by watching the apparatus for some time it was seen that in calm weather there were seiches having a period of several minutes and an amplitude of several inches.

In biology the greatest interest lies in the discovery of abundant fresh-water microscopic life in the frozen lakes, despite the fact that these only thaw for a short period in summer, and some of them only at long intervals. Even in a lake which never melted while we were there, there were many living animals on the bottom, under 15 feet of ice. The adult animals survive from season to season in a dormant condition, frozen in the ice.

Several are viviparous, and those are the most plentiful of all. Their abundance would be remarkable in any latitude. In the few weeks of summer one of them increases so rapidly that it makes blood-red stains on the beaches of the lakes, and these attain to inches in diameter. They can endure great vicissitudes of temperature, and some have lived after being made to pass in a short time through a range of 240° Fahr. The whole range endured by one species was over 300° Fahr., but the same individuals were not submitted to both heat and cold.

The composition of the fresh-water microfauna, which is not very abundant in species, is of great interest. Its negative as well as its positive characters raise many curious questions in geographical distribution.

In marine biology it is instructive to note that all the cold-blooded animals pass their entire lives at a temperature which is always several degrees below the freezing-point of fresh water, and that this temperature is therefore high enough for the performance of all their physiological functions.

REVIEWS.

EUROPE.

A Region of France.

'Le Var Supérieur. Étude de Géographie Physique.' Par Jules Sion, Ancien Élève de l'École normale supérieure, Docteur ès Lettres. Pp. 96. Paris: Colin. [1909.] *Price* 3 *fr.*

This is one of those detailed studies in physical geography which are now becoming so numerous and which illustrate the action of natural forces under varying conditions. The region chosen is the upper valley of the Var above the affluents descending from the massive of the Mercantour, an area of nearly 45 square miles. Further south the river meanders through a pebbly plain in a bed recently eroded in an immense Pliocene delta.

The author first describes the movements of the soil, the foldings which took place before the Permian age and at the conclusion of the Secondary period, the invasion of the Miocene sea and the elevation of the Miocene beds and also of the Pliocene, the latter to a height of about 1800 feet at Levens, while along the littoral of Nice Quaternary deposits occur at a height of about 190 feet above sea-level. A study of the structure shows that the hydrography in the upper basin of the Var often does not accord with the tectonique: the river often runs in a direction contrary to the dip of the strata, crosses anticlinal ridges, cuts into the flank of the Dôme de Barrot, which is traversed by one of its tributaries, the Cians, and even when it follows a synclinal basin, it remains at a distance from the axis of depression.

In the section Saint-Martin-Guillaumes-Enriez, which the author calls the "Var de Guillaumes," the river skirts such a synclinal depression, and formerly it terminated in the Annot hollow, but was subsequently captured by the "Nar de Touët," which is guided by a synclinal area below Entrevaux. How the present hydrographical system has been formed in all probability—for many details have not yet been fully demonstrated—is explained in this work, and there are also chapters on the torrential *régime* and deforestation with its disastrous effects.

A great defect is the absence of maps. Orographical and geological maps, however crude, would assist the reader, to whom the maps referred to by the author may not be easily accessible, in understanding the text.

'Les Grands Ports de France.' By Paul de Rousiers. (Paris: Armand Colin. 1909. 3.50 *fr.*) A monograph on the economic conditions of the ports of France. The author examines each instance from three points of view. (1) Regional: The capacity of a port for affording access to a hinderland. (2) Industrial: Convenience for trade; customs and regularity of traffic. (3) Convenience for maritime trade. Many ports, as Le Havre, fall under all three divisions; others under one only. Dunkerque is almost entirely regional. Rouen depends mostly on its traffic with the Paris basin. The commercial history of the ports is interestingly described, and their present trade and advantages discussed in a series of chapters devoted to the several ports. The book should be of value to students of economics.

'Cornwall.' By S. Baring Gould. ("Cambridge County Geographies" Series. Cambridge: University Press. Pp. ix., 164. *Maps and Illustrations.* 1*s.* 6*d.*) The series maintains its standard of excellence in this volume—of this the author's name should be sufficient guarantee. When so many different writers have contributed to the series, it is good to see the close editorial control that has been maintained over all, so that the uniformity of the series does not suffer.

'The Marlborough Country.' By H. C. Brentnall and C. C. Carter. (Pp. 77. *Diagrams.*) This memoir on sheet 266 of the 1-inch Ordnance Survey has been written for the use of Marlborough college, and sets an example which might well be followed. It teaches the study of topography and land-forms in connection with the map, and it pays particular attention to the monuments of antiquity (Avebury, Silbury, and a host of others less well known) with which the district abounds.

ASIA.

The Garos of Assam.

'The Garos.' By Major A. Playfair, I.A. With an Introduction by Sir J. Bampfylde Fuller, K.C.S.I., C.I.E. (Published under the Orders of the Government of Eastern Bengal and Assam.) *With Illustrations and Maps.* Pp. xvi., 172. London: Nutt. 1909. Size $8\frac{1}{2} \times 5\frac{1}{2}$. *Price* 7*s.* 6*d.*

This book is another volume of the excellent series of monographs on the tribes of Assam, which is being issued under the auspices of the Government of the province. The plan and arrangement of the earlier works have been strictly followed in this volume—that is to say, there are sections on the People, their habitat and affinities, Domestic Life, Laws and Customs, Religion, Folk-lore, and Language.

The Garos inhabit, in the main, the range of hills on the west of Assam, but they are also found sporadically distributed over other parts of the province. A branch of the great Tibeto-Burman family, they have migrated, in common with other tribes, from the region of the Himalayas, and Major Playfair has been fortunate enough to recover some of their traditions regarding these wanderings. Like the

Khasis, the tribe is matriarchal, and an interesting custom, known as teknonymy, exists amongst it. By this custom parents are not known to their inmates by their own names, but by the name of their child, an affix being added to signify father or mother. Also, should they have but one child, and should that child die, they are known respectively as father or mother of a ghost.

The book well maintains the high standard of excellence set by the other volumes in the series, and is a credit alike to the author, the publisher, and to the Government to whose enlightened policy it is due.

H. S. K.

NORTHERN CHINA.

'Tramps in Dark Mongolia.' By the Rev. John Hedley. London: Unwin. 1910.

Mr. Hedley's wanderings lay in the north-east of the Chih-li Province beyond the Great Wall, and immediately to the north of the railway which runs along the coast of the Gulf of Liao-tong. In one sense it is not a very remote or inaccessible region, for the proximity of Chin-wang-tao, the new harbour dating from the time of the Boxer rebellion, as well as Shan-hai-kwan, so attractive to tourists, and the railway itself, all combine to bring travellers. But few, one can well understand, might care to prolong their trips into the hinterland, which to any one less versed in the Chinese language and ways would not prove so interesting as it did to the author. Mr. Hedley visited, in the course of his numerous trips, all the chief towns, and his knowledge of the vernacular enabled him to converse with all ranks and conditions of men, thus picking up a wealth of information at first hand regarding a people whose habitations, mode of living, and general customs have in all probability not varied much during the last three thousand years. In some of the districts Mr. Hedley was treading in the footsteps of a former missionary, Mr. James Gilmour, whose good deeds and influence are gratefully remembered by many of the rough people among whom he laboured so long. In other tracts beyond the Great Wall the author was occupied in filling up blanks in the topography of Mongolia indicated to him by Lieut.-Colonel Wingate, brother of the Sirdar of Egypt, and at that time head of the Intelligence Branch of the North China command. The resulting picture presented to us is more ethical and popular than geographical and scientific; nevertheless it affords a very instructive notion of the characteristics of the Chinese and Mongols in the border lands where these two races meet. The Government of the country is unfortunately very corrupt and bad, brigands are met with everywhere, and oppression is widespread, and in short the administration of Outer Chih-li is pronounced to be a reproach and a shame to the Central Government of Peking, and deserving the reprobation of all just men. "And that," adds the author, "is a very mild way of putting the truth!" To exploit China for the benefit of a people 12,000 miles away is, he considers, an indefensible proceeding. But when those responsible for the government of the country so shamefully fail in their duty, the opening up of the gold and coal mines to foreigners would prove a blessing instead of an injustice to the people. The granting of mineral and railway concessions the author recommends as effective means for the development of a country that has great possibilities of prosperity and enrichment.

'Studies in Galilee.' By E. W. G. Masterman. (The University of Chicago Press. 1909. *Maps and Illustrations.* $1.) An interesting monograph on Galilee as a whole, its structure, frontiers, divisions, natural products, the resulting characters of its people's life, and its place in history. The geographical description is admirable, and the illustrations materially assist the understanding of the text.

To take one example. The author mentions the importance of the "dew" in summer both for the harvest of the ripened grain and for figs and olives. This is really the mist on the highlands, which supplies the want of rain by its regularity after sunset. The wealth of detail given in the description of famous sites should render the work valuable to historical students.

'Sport and Life in the Further Himalaya.' By Major R. L. Kennion. (Edinburgh: Blackwood. 1910. Pp. xii., 330. *Illustrations.* 12*s.* 6*d.*) An excellent series of sporting narratives, told by a traveller who evidently loves not his sport only, but the countries where he finds it. In his search he has been further than most men into the Himalaya; he has launched the first boat on the great lake Pangong and others, and his book may well interest more than hunters.

'A Journal from Japan.' By Marie C. Stopes. (London: Blackie. 1910. Pp. xiv., 280. *Illustrations.* 7*s.* 6*d.*) The writer of this diary made a scientific study of various coal-mines and their fossils, under the auspices of the Royal Society. The scientific results are appearing elsewhere, but the present volume is of value for its descriptions of places visited by few Europeans, and, in a more general way, for the writer's close accounts of her intercourse with the Japanese. The whole is in diary form, and has been little altered from the condition in which it was written, with no view to publication. But it does not suffer for that.

'A Journey in Southern Siberia.' By Jeremiah Curtin. (London: Sampson Low. 1910. Pp. xiv., 319. *Map and Illustrations.* 4*s.* 6*d.*) The writer of this work, an American ethnologist and linguist of high attainments, died in 1906. His volume is less of a narrative of travel than a study of the Buriats, their manners, customs, religion, and mythology. The author condemns his own collection of myths and folk-tales as small, but it occupies a large part of the volume; the stories are vivid and curious, and are anglicized at a high standard of scholarship.

AFRICA.

The Masai.

'Die Masai, Ethnographische Monographie eines ostafrikanischen Semitenvölkes.' By M. Merker. Second corrected and enlarged edition. *Map, 6 Plates, and 151 Illustrations.* Berlin: Reimer. 1910.

The first edition of Captain Merker's monograph, issued in 1904 and somewhat fully noticed in the *Journal* for April, 1905, was so well received that it ran out in three years. But while the author was busy collecting the materials for this second edition, he was carried off by African fever in February, 1908. These materials were then entrusted to his friends, Dr. Sander of Berlin and Dr. Hommel of Munich, who embodied them in the text, which they further enriched with two long and informing introductions. In other respects the text remains much as it was, the chief addenda being a considerable number of illustrative plates and anthropometric tables.

As may be seen from the title, M. Merker still adheres to his peculiar views regarding the remote Hebrew origin of the Masai beliefs, which were severely attacked at the time, but, strange to say, are now again vigorously upheld by Dr. Hommel. But we need not return to this question, since it is dealt with in the original review, and Dr. Hommel, though a brilliant Orientalist, is more noted for his extravagant theories than for his sound teachings.

A. H. K.

Canary Islands.

(*a*) 'Beiträge zur Kenntnis der Vegetation der Canarischen Inseln.' (Wissensch. Ergebn. Deutsch. Tiefsee-Expedition auf dem Dampfer "Valdivia," 1898–99. Bd. II. Theil I. Liefg. 2 — Theil III.) Jena. 1907.

Albeit surveyed and searched so frequently in the course of the last century, and by such prominent men as Humboldt, L. von Busch, Barker Webb, Berthelot, Carl Bolle, G. F. Bunbury, H. Schacht, and H. Christ, the Canaries continue to offer ever fresh interest and problems to the modern plant geographer. The present monograph, joint work of the late A. F. W. Schimper and H. Schenck, is very useful and important as summarizing our knowledge of the plant-geography of the Canaries, and, indeed, of much of the other sub-tropical Atlantic groups, and considerably adding to it.

Taking Tenerife as a type, the altitudinal division of the islands is thus re-stated:—

(1) A lower zone, 0–2800 feet.

(2) A mountain zone, including a lower belt to 4000–4800 feet, with hard-leaf evergreen māquis on the open slopes; but evergreen, temperate rain-forests, subsisting in small vestiges in remote gorges.

(3) The upper gorges belt extends to 6000–8000 feet above sea-level, and includes most of the pine forest or piñar.

More or less scattered bushes of *Retama Blanca*—a kind of broom—characterize the alpine zone, which reaches 8500 feet. A few stunted specimens even reach 9000 feet. Beyond that altitude only lichens and mosses can be seen.

The lower zone is really one of semi-deserts, mainly of succulent plants, greatly resembling the semi-deserts of South Africa. It is largely African in its floral affinities. The well-known dragon trees and the Canarian date-palms are the chief trees, to which one may add the olive, the Atlantic pistacia, and the Phenician juniper. The most characteristic plant forms are the succulents, the "federbusch"-shape of which a long-stalked and branched house-leek would convey a rough idea, the "Plocama" shape, with drooping feathery bunches, the Spanish broom, and the heather types. Wind is one of the main influences Canarian vegetation has to contend with, and to which it has to adjust itself like the animal world. Outside the cultivated alluvia in the depressions, this zone offers little else than stone-fields and rocks, with a strand margin on the east.

The mountain zone is partly Mediterranean and partly rain-forest. The drier or Mediterranean aspect, characterized by the typical māquis, is seen on the open slopes. In secluded gorges, however, the vestiges of an interesting vegetation, typified by the laurel forest, or temperate evergreen rain-forest, have found refuge. Now occurring only on small and scattered areas such as Japan, New Zealand, Southern Chile, and South Africa (Knysna), they represent the modified relics of the Pliocene vegetation of south-western Europe, from which they differ in their evergreen character. The laurel-forest is restricted to the Western Canaries and Madeira, and recurs in an impoverished condition on the Azores. It is lacking on the East Canaries and the Cape Verde group.

The existence of the "Piñares" above the preceding belt is stated to be due, not to soil or rainfall, but to the abundance of clouds and mists on the upper slopes. A further interesting relic is the cedar-juniper, which will soon be relegated to museums and gardens.

More than half the plant-population of the Canaries is endemic, and although it has undoubted relationship with tropical and South Africa, has largely originated from the flora of Pliocene south-western Europe, slowly modifying itself so as

better to meet the requirements of the new environment. It offers most interesting "living fossils" from Tertiary times.

The analysis and interpretation of the vegetation of the lower and middle zones, written for this work by the late A. F. W. Schimper, are truly admirable, and will undoubtedly remain as standards and models of their kind. Modern plant-geographers who derived such a powerful inspiration from the general principles of ecology as outlined by the master, but were somewhat confused and bewildered in their application to detail, will undoubtedly welcome the fertile suggestions condensed in this monograph. The style of presentation of the book and its illustrations are fully on a level with those of the monograph on South Africa already reviewed in the *Journal*.

(*b*) 'Eine Exkursion nach den Canarischen Inseln.' Von Dr. C. Schröter. Zürich: Rascher & Cie. 1909. 3*m.* (*bound*, 4*m.*).

This little book is the outcome of a joint excursion undertaken by the students and professors of the Polytechnikum of Zürich and other Swiss universities. The expedition lasted six weeks. The party of thirty-four included various specialists, one geologist, two geographers, five botanists, one gardener, one zoologist, one hygienist, one chemist, three medical men, two secondary teachers plus some tradesmen. They were conducted by Dr. Rikli, who had carefully pre-arranged the programme. The excursion was successful in every respect.

No more favourable field for work could have been selected than the Canary islands, with their wealth of problems and their natural beauty. This group affords indeed the key to many geographical, palæontological, and other biological puzzles, and constitutes a magnificent natural laboratory wherein to study the origin and evolution of new species. The result is a clear and valuable compendium of observations and information, a sort of guide-book for students and school parties. Though its interest is mainly botanical, it includes notions of the human and animal world, of physiography and agriculture. It might, indeed, have been expanded easily so as to embrace a sketch of human, social, and economic geography. But it would be hardly fair to find fault with the limitations considering the quality of the actual achievement.

Now this idea of school, college, or university excursions ought surely to appeal to the student world in this country. It is already become a fixed item in some institutes in France, *e.g.* Montpellier. Here we have had excursions initiated in Oxford by Prof. Herbertson, in London by Prof. Oliver. There are annual excursions organized by various learned societies, *e.g.* the arboricultural societies. Surely no more profitable scheme could be introduced as a standing feature of our university and higher school life. It would be easy, with the co-operation of specialists in various branches, to give these expeditions an all-round geographic interest, not forgetting the synthetic but too much neglected social side.

M. H.

EAST AFRICA.

'To Abyssinia through an Unknown Land.' By Captain C. H. Stigand, F.R.G.S., F.Z.S. 36 *Illustrations*, 2 *Maps*. London: Seeley & Co. 1910. 16*s. net.*

Captain Stigand is already favourably known as a writer on the big game of Africa; in the book before us, as its title indicates, he does not deal (save incidentally) with hunting adventures, but gives the story of a very creditable piece of exploration. When in April, 1908, the author found himself at Nairobi, with a year's leave, he sought for virgin soil to conquer, and found it in the country east of Lake Rudolf and south of Lake Stefanie. Though known in part for twenty years, this region, on account of its sterile character, still contains unexplored tracts—one of the blanks Captain Stigand has filled in. His journey in unknown

regions extended, more or less, along the line of 37° E., from about the equator to 4° N., that is from the Guas Nyiro (where it crosses the Laikipia plains) to Alia bay, on the east shore of Lake Rudolf. From the Guas Nyiro through the country of the Sambur—of which tribe we are given an attractive picture—the track followed led north to the foot of the high, flat-topped mountains which run south-east of Rudolf. Passing between these mountains and the General Matthews (or Lengiyo) range, a sandy, waterless, thorn desert, the Elges, was entered. The route was now south-east along the north side of the Matthews range, and later north-east by the foot of a lava escarpment (from 100 to 200 feet high) which is the western edge of a lava plateau sparsely inhabited by Rendile and Boran. At a few places along the base of the lava walls were wells and oases, and Captain Stigand hoped to push north to Abyssinia without touching Lake Rudolf. But after struggling along to Kalacha (3° 8′ N.), he was forced to abandon the direct road through lack of watering-places. He therefore turned west across an uninhabited lava plain, and after a trek of about 100 miles (with only one well passed *en route*) Lake Rudolf was reached. That lake, Captain Stigand believes, is diminishing in size. What were islands in Alia bay in Teleki's time are now half a mile inland.

This is a bare summary of that part of the author's journey which was through unknown or scarcely known lands. It was a very trying march, and called for the exercise of the highest qualities of leadership; otherwise the whole party might have perished from thirst. Unfortunately, the author has not systematized his information, but it would seem that this desolate, lava-strewn corner of the British Empire, save for possible mineral wealth, will never be of much economic value. How near the author came to joining his route up with that of Captain Maud's from the north, a comparison of the maps of the two expeditions will show. As a result of Captain Stigand's journey, several corrections in, as well as numerous additions to, the maps of the region have been made.

The second part of the volume, dealing with the journey through southern Abyssinia, is chiefly valuable, perhaps, for the pleasing light it throws on the manner in which the Abyssinians are governing their subject races. As we have said, this is not a systematic treatise, and the geographer must piece out the information as he goes along, dipping into the rich *olla podrida* the author has provided. The narrative, as travellers' tales are wont to do, continually digresses into dissertations on the natives, folk lore, hunting stories, and the hardships and delights of the journey. Many of the notes on the natives are of value to the ethnologist and the book is distinctly above the average of works of its kind. The illustrations are of real merit. F. R. C.

'The Passing of the Shereefian Empire.' By E. Ashmead Bartlett. (Edinburgh: Blackwood. 1910. Pp. xii., 532. *Maps and Illustrations.* 15*s.*) This large and closely written volume is the outcome of personal observation in Morocco during the past two years. It is a detailed political study in the main, and its conclusion is sufficiently indicated by the title. Few works on Morocco of to-day are particularly pleasant reading if they faithfully reflect the condition of the country as this does. The chapters on the Spanish campaign are very full and should be of permanent value.

'The Handbook of Nyasaland.' (London: Wyman. 1910. Pp. 288. *Maps and Illustrations.* 3*s.*) This valuable general guide to the geography, history, administration, population, and resources of the Nyasaland Protectorate reaches a second edition. It has been carefully revised and brought up to date, and is excellently illustrated. An increased number of such handbooks would be welcome.

AMERICA.

South American Ethnology.

'Antiquités de la Region Andine de la République Argentine et du Désert d'Atacama.' 2 vols. By Eric Boman. *Numerous Maps, Plates, and Illustrations.* Paris: H. Le Soudier (Imprimerie Nationale). 1908. 25 *francs.*

'Géographie des Hauts-Plateaux des Andes.' By V. Huot. (Same publishers and date.) 5 *francs.*

Both of these works, which are issued in uniform type and format, belong to the comprehensive series which is now appearing as a result of Messrs. G. de Créqui Montfort and E. Sénéchal de la Grange's 'Mission Scientifique.' M. Boman, sole author of the 'Antiquités,' is the Swedish explorer who had already been associated with Baron Erland Nordenskiöld's expedition of 1901 to North Argentina and Bolivia. He had also visited the provinces of Catamarca and Tucuman, and afterwards returned to the same region as an active member of the "Scientific Mission." Here he has done excellent service, especially in investigating the prehistoric remains and pre-Inca culture of the *Diaguitas*, perhaps better known as *Calchaquis*, with whom the 'Antiquités' is mainly occupied. This semi-civilized and warlike nation, which commanded most of the region between the Peruvian empire and the Brazilian wilds, had already been often referred to by the early Spanish writers, and recently more fully by M. Ten Kate of Buenos Aires, so that we have now a somewhat ample account of the people who, next to the Incas, ranked as the most powerful and progressive nation in South America.

The Calchaquis, it should be mentioned, were the chief and dominant members of the Diaguita family, whose influence appears to have been felt as far west as the Atacameno lands, and even at some points down to the Pacific seaboard. The historical student is often surprised that the Incas were unable to extend their empire much beyond the northern parts of the present state of Chile. But the explanation is now afforded by the predominance of the hitherto much-spoken-of but little-known Atacameños, no doubt in alliance with the potent Calchaquis farther east. From this alone may be inferred the great value of the archæological researches of Ten Kate and M. Boman amid the Calchaqui ruins scattered over their former domain. These remains are centred chiefly in Catamarca, Tucuman, and Salta, which provinces had been conquered by the Inca, Huaina Capac, about 1450, whence, on the arrival of the Spaniards, everything was supposed to be Peruvian, much to the surprise of those familiar with the real Peruvian industrial objects. The people themselves were taken for Peruvians, since many had at that time adopted the Quechuan language, which even still survives amongst some scattered groups in the more secluded uplands. Cacan, their own tongue, differed altogether from Quechuan, and was no doubt a stock language. But it is quite extinct, and most of the Calchaquis are now merged in the general Hispano-American population of Spanish speech. Their very name was thus forgotten, and their history had to be reconstructed from a study of the old graves, mounds, ramparts, forts, pottery, and other remains recently discovered in the northern parts of Argentina and the adjacent Bolivian and Chilian districts. From a study of the human remains found in the graves, it appears that the Calchaquis practised cranial deformation to an extreme extent, and nearly all the skulls presented a high degree of brachycephaly; in fact, the highest yet recorded, rising even to over 100°, with a mean of about 90°, where, of course, artificial deformation has to be allowed for.

The second part of the 'Antiquités' (pp. 390–948), including tables of contents, lists of illustrations, indexes, etc.) is mainly devoted to "La Puna and its Present Inhabitants." By "Puna" are here to be understood all the lofty table-lands which have been more than once explored by M. Boman, and the position of

which has already been outlined. It is safe to say that we have here the fullest and most attractive monograph ever written on the rarely visited natives of these remote uplands. Their social organization, industries, religion, traditions, folklore, amusements, superstitions, languages, food, and drink are amply described, and few gleanings are now left for M. Boman's successors to pick up. Much attention has been given to the curious petroglyphs, or rock carvings, which occur almost everywhere, and many of which present such remarkable uniformity in outline, general design, and character as to suggest a common origin. These are generally illustrated and grouped together for comparative study, and M. Boman notices that most of them occur along the highways that were frequented in pre-Hispanic times, especially in districts where these routes traverse narrow parts of the valleys or run along the foot or summit of mountain passes and gorges. From this and other indications, he thinks that they date from the same epoch, and betray no trace of different peoples that may have successfully occupied this region at different times.

Several instances are given of the strange way the old primitive beliefs still survive amid the present veneer of Christianity. A mythical hermaphroditic being called Coquena appears to be still venerated, and some educated people are mentioned to whom he (or she) is supposed to appear from time to time. He is represented as a dwarf born of the Earth without father or mother, and several pages are filled with his exploits and adventures amongst the present inhabitants, who are absolutely convinced of his existence.

These volumes are richly furnished with 3 maps, 83 plates, 73 illustrations in the text, a very full bibliography, and copious index.

The accompanying 'Géographie' by M. Huot calls for no special remark. It is a short but well-digested account of the main orographic features of the Central Andine uplands without any claim to novelty.

A. H. Keane.

British Guiana.

'Handbook of British Guiana.' 1909. Edited and compiled by G. D. Bayley, Georgetown (London: Dulau & Co.). 1909. 5*s*.

This handbook contains an admirable account of the geography and general development of British Guiana. The geography and topography has been contributed by Mr. C. Wilgress Anderson, F.R.G.S., whose large photograph of the Kaieteur fall, nearly five times the height of Niagara, is in the possession of the Royal Geographical Society.

The forests of British Guiana cover about six-sevenths of the whole area, and have as yet been very little exploited, except for the purpose of obtaining balata and rubber. If means can be found to transport the timber to the coast, there is little doubt that the valuable woods of the interior will form an important asset in the resources of the country. The savana lands cover about one-seventh of the area, and are divided into two varieties—the coast land savanas and the elevated hinterland savanas. Agriculture is practically confined to a small area near the coast, and sugar is still the most important industry. Successful experiments have been made in the growth of bananas, cacao, and coffee, and it is probable that these products will increase in importance.

The illustrations accompanying the book are excellent and well chosen, and the Permanent Exhibitions Committee must be congratulated on the production of a thoroughly satisfactory account of the country's resources. A. W. A.

'En Haïti.' By Eugène Aubin. (Paris: Colin. 1910. Pp. xxxv., 348. *Maps and Illustrations.* 5 *fr.*) The writer, we are told, spent eighteen months in Haiti, and travelled extensively there, visiting parts hardly known to the present

generation. His book is specially interesting when it deals with the people, and their peculiar mixture of barbarism and European culture is brought home to the reader. If the author descends at times to almost trivial detail, his light descriptive style makes his work easy to read, while the illustrations are excellent, and the coloured maps of the republic and of the vicinity of Port au Prince are very fair.

'Brazil in 1910.' By J. C. Oakenfull. (Devonport: privately printed, 1910. Pp. 280. *Maps and Illustrations.*) A useful handbook to the republic, completely brought up to date since the exhaustion of the first edition, which appeared under the title of 'Brazil in 1909.' It should be found especially useful on the economic conditions and possibilities of the country, and the descriptive parts are clear and terse. The illustrations suffer from poor reproduction, and with the dedication we could well have dispensed.

POLAR REGIONS.

Dr. O. Nordenskjöld on the Polar World.

O. Nordenskjöld, 'Die Polarwelt und ihre Nachbarländer.' Leipzig and Berlin: Teubner. 1909. Pp. vii. + 220. 77 figs. 8*m*.

Dr. Otto Nordenskjöld, the leader of the Swedish Antarctic Expedition, has undertaken extensive travel in both the Arctic and Antarctic regions. In 1907 he gave a course of popular lectures on the Polar world to the University of Gottenburg; and he has now issued a short work based upon these lectures, describing the chief features of the Polar and sub-Polar lands, and explaining some of their most interesting and instructive lessons. The book is essentially popular in style, gives no references and mentions but few authorities. It is not a complete synopsis of existing knowledge of the Polar regions, but a sketch, dealing especially with those areas which Dr. Nordenskjöld has himself explored. Its main value is as a personal statement of its author's conclusions on many of the interesting geographical and geological problems, of which the Polar regions may give the solution. It is illustrated by a well-selected series of instructive photographs, but the only map is of part of Patagonia.

The book describes the chief lands along the Arctic Circle including Greenland, Iceland, Spitsbergen, north-western Europe, Siberia, Alaska and northern Canada. There is a short account of the result of recent Antarctic research, and a relatively fuller description of Patagonia. The geographical descriptions are necessarily brief, but they include the chief points in the topography, ethnography and glacial geology. The author devotes especial attention to the glacial phenomena and the light they throw on the former glaciation of north-western Europe. He shows that most sub-Polar lands once had more extensive glaciers than at present, and attributes the former greater development of the ice to a world-wide climatic change. He appears to attach undue value to the identification and evidence of fossil leaves as an indication of former climates. Thus he figures two leaves of Araucaria from Seymour island and describes them as "subtropical"; but those very adaptable trees, the monkey's puzzle and the Norfolk island pine, are not necessarily subtropical, as is shown by their flourishing growth respectively in northern Scotland and southern New Zealand, under conditions which are sub-polar rather than subtropical. Dr. Nordenskjöld's comparative illustration of Arctic and sub-Antarctic localities shows their striking resemblance, and amongst other interesting points of comparison is the recent extinction of such animals as the Grypotherium, of which the remains have been found in the cave of Patagonia, and of the mammoth and rhinoceros in Siberia. He discusses the probable formation of the ice in which the Siberian mammoths were entombed, and indicates the difficulties in regarding

it as due to the freezing of flood waters or swamps. He is disposed to accept his compatriot Arrhenius' theory of the cause of the former extension of the glaciers; but he recognizes that extinct glacial centres were not synchronous, and that some Arctic areas, such as Siberia and parts of Alaska, escaped glaciation.

J. W. G.

MATHEMATICAL AND PHYSICAL GEOGRAPHY.

Marine Deposits of the Pacific.

'The Depth and Marine Deposits of the Pacific.' By John Murray and G. W. Lee. With five Plates and three Maps. 'Memoirs of the Museum of Comparative Zoology at Harvard College,' vol. 38, No. 1. 1909.

The marine deposits of the Pacific studied by Sir John Murray and Dr. G. W. Lee were collected by the late Dr. Alexander Agassiz during his third and fourth expeditions (1899–1900 and 1904–1905) on the U.S.S. Fish Commission steamer *Albatross*. The number of samples fully described amounts to 137.

The types of deposits to which the samples are referred are as follows: *Globigerina Ooze, Red Clay, Green Mud, Blue Mud, Calcareous Mud, Volcanic Sand, Diatom Ooze.* All these deposits belong to the "deep-sea deposits" formed beyond the 100-fathom line.

A. *Pelagic Deposits.* (1) *Globigerina Ooze* was the deposit most frequently met with. The organisms that make up the calcium carbonate belong mostly to pelagic Foraminifera. Among calcareous remains of other organisms that accompany the Foraminifera the most frequent are Echinoid spines and fishes' teeth.

(2) *Red Clay.*—The mean percentage of calcium carbonate in the *Albatross* red clay is 5·33 per cent. The mean percentage of calcium carbonate in the red clay of the whole ocean is, according to the *Challenger* Reports, 8·39 per cent. from 2000 to 2500 fathoms, and 7·16 per cent. from 2500 to 3000 fathoms. The lower percentage in the case of the *Albatross* red clay may very likely be due, as pointed out by the authors, to the influence of surface currents in this part of the ocean.

(3) *Diatom Ooze* is represented by a most interesting sample from station 4674, lat. 12° 14·4′ S., long. 78° 43·4′ W., depth 2338 fathoms. Quite 80 per cent. of the deposit consists of the remains of siliceous organisms. Diatoms are the most abundant, and are accompanied by Radiolaria and minute sponge spicules. It is free from the remains of lime-secreting organisms. Numerous pebbles, from 1 to 15 mm. in diameter, are scattered in the mass. An unusual interest attaches to this deposit: a diatom ooze formed in a tropical region and yet free from calcium carbonate. The presence of so many large fragments of rocks of continental origin is a most interesting feature. The authors suppose that in this case the pebbles have been carried from the continent to this point by some such agent as the roots of a floating tree, and that they happened to be in the way of the trawl, although otherwise quite rare.

B. *Terrigenous Deposits.*—(1) *Green Mud* was formed in two stations, in 776 and 1036 fathoms, and *Green Sand* in 556 fathoms. Glauconite is, as usual, the characteristic mineral of these deposits, and is accompanied by a green flocculent matter, which the authors show to be of vegetable origin, as had been rightly surmised by Sir John Murray and the late Prof. Renard.

(2) *Calcareous Mud.*—In lat. 21° 4′ S., long. 133° 1′ W., in a depth of 2225 fathoms, a very peculiar deposit has been found by Dr. Agassiz. It is essentially composed of Coccoliths and Tunicate spicules, together with a large amount of calcium carbonate, so finely comminuted as to appear quite amorphous under the microscope. As this sounding comes after a series of soundings which had revealed the presence of coral sand in the vicinity of Manga Reva, Sir John Murray and Dr.

Lee think that this mud may possibly represent a finely comminuted *Coral Mud*, the finer parts of which have been carried to the place where they have been deposited. It must be observed, however, that there is no known coral reef within 150 miles of this position.

Mineral Constituents observed in the Different Deposits.—Augite, plagioclase, volcanic glass, and magnetite are the minerals usually found in the Globigerina Oozes in this part of the Pacific. The oxides of iron and manganese, in the shape of minute grains, are seldom absent. The study of the "*Albatross*" deposits shows that "*manganese nodules are by no means exclusively characteristic of Red Clay. Their origin depends more on a ready supply of manganese and iron than on depth, and is not dependent on the presence or absence of calcareous organisms.*" In fact, a large number of the nodules dredged by the *Albatross* were obtained in typical Globigerina Ooze areas. The authors point out that the nature of the inorganic constituents of a Globigerina Ooze, formed far from land, is very similar to that of a Red Clay, not only as regards chemical constitution, but also as regards the secondary products formed *in situ*. Thus the zoolite *Phillipsite* is recorded from numerous Globigerina Ooze stations, as well as from Red Clay.

Manganese Nodules.—The large number of stations at which *Manganese Nodules* were obtained show the eastern Pacific area to be remarkably rich in these concretions. The wealth of morphological variation exhibited by the nodules from different stations is illustrated by five photographic plates. We have here at the same time equally striking examples of the fact, pointed out long ago by Murray and Renard, that, as a rule, all the nodules from a restricted area are built according to a definite pattern, and bear a strong resemblance to each other, though differing widely from the nodules obtained in other regions. An exception to this rule would appear to be shown by the material dredged at Station 4656 (lat. 6° 54·5′ S., long. 83° 34·3′ W., depth 2222 fathoms), but here, instead of true nodules, we have irregularly shaped lumps, the products of the deposition of manganese-iron oxide around a very different centre of accretion. Some of these are undoubtedly siliceous sponges impregnated with the oxides. The close relationship existing between the manganese-iron oxides and the decomposition of volcanic rocks is illustrated by the common occurrence of slab-like cakes of decomposed volcanic ash impregnated with these oxides.

The authors give, also, the detailed descriptions of bottom samples collected during the third expedition of Dr. Agassiz, eastward of the track of the last expedition.

The Depths of the Pacific Ocean.—The authors arrive at the conclusion that the bathymetry of the Pacific is now known in all its broad general outlines. The authors have summarized our present knowledge of the depth of the Pacific on an equal surface projection hemisphere, contour-lines being drawn in at depths of 100, 500, 1000, 2000, 3000, 4000, and 5000 fathoms. Planimeter measurements show that the largest area is that between 2000 and 3000 fathoms in depth. There are thirty-one "deeps" (over 3000 fathoms) shown on the map, mostly confined to the western portion of the ocean. The deepest sounding known at the present time is one of 5269 fathoms in the "Challenger deep," obtained by the U.S.S. *Nero* near Guam island, one of the Ladrone group in the North Pacific, in November, 1899.

The distribution of marine deposits in the Pacific is shown on a special map. One of the chief results of Dr. Agassiz's exploration is the discovery that the area covered by Globigerina Ooze on the floor of the eastern Pacific is much larger than was hitherto supposed to be the case.

The approximate area covered by the different types of deposits is given as follows:—

	Square miles	Per cent.
Red clay	29,300,000	47·0
Globigerina ooze	16,540,000	26·5
Diatom ooze	3,630,000	5·9
Radiolarian ooze	3,330,000	5·5
Pteropod ooze	120,000	0·2
Coral mud and sand	1,330,000	2·1
Other terrigenous deposits	8,040,000	12·8
	62,290,000	100·0

The percentage of calcium carbonate in the deposits of the Pacific Ocean as a whole is shown on a map by four shades of green colour.

On comparing this map with the bathymetrical map, it will be observed that the higher percentages (over 75 per cent.) of calcium carbonate correspond generally with moderate depths and to the shore regions where coral reefs are met with. The lower percentages correspond with the deep water, and to shallow water around the continents and islands not of coral origin.

Some notes on a *Palagonitic Tuff*, by Dr. W. A. Caspari, appear as an appendix. This substance is somewhat a novelty in deep-sea deposits. Its chemical constitution and behaviour towards chemical reagents lead Dr. Caspari to the interesting conclusion that we have at this station (Station 2, 2368 fathoms) a thick semi-compact deposit of *zeolitic* matter arriving from the decomposition of layers of volcanic ash which have fallen on a Red Clay bottom. Further notes by Dr. Caspari bear on the relation between certain Red Clays and palagonitic materials, from which they may be derived.

Although the new points only are mentioned in the above review, the authors must be congratulated for having also brought together a large amount of general information, which will be read with profit by all physiographers.

LÉON W. COLLET.

BRITISH ANTARCTIC EXPEDITION, 1910.

CAPTAIN SCOTT has had the honour of being received by the King, who showed the greatest interest in the plans of the British Antarctic Expedition. Queen Alexandra has presented Captain Scott with two Union Jacks, one of which, the larger, will be carried on the southern journey, flown at the most southerly point reached, and brought back and given into her Majesty's hands. The second flag is stronger in texture and smaller in dimensions, and is to be left flying as a permanent record at the most southerly point reached. Captain Scott left Waterloo on July 16, *en route* for the Cape, where he will find the *Terra Nova*. Captain Scott, who was accompanied by Mrs. Scott, had an enthusiastic send-off by the many friends who gathered at the station.

There is still a deficiency of £8000 in the sum required to carry out the programme of the expedition; any Fellows disposed to contribute, may send their subscriptions to the Secretary of the Society.

THE MONTHLY RECORD.

EUROPE.

The Port of Antwerp.—A Consular Report (Annual Series, No. 4405), by Sir C. Hertslet, shows an increase in the shipping returns of the port of Antwerp for 1909 over those of previous years, such as not only justifies the construction of new coast docks, but is likely to call for further additions to the shipping accommodation in the future. The figures of British shipping, though greatly increased, still show a shortage of 1521 tons for those of 1907. German shipping, on the other hand, has, since 1907, grown to the extent of 398,732 tons. A project is on foot for improvement of communication between Antwerp on the right bank and Tête de Flandre on the left. The two subsidiary docks begun in 1908, already well advanced in their construction, and calculated to be floated within three years, will have a water area of 136 acres, adding 5796 yards to the quay space. On their completion and connection with the intercalary docks, Antwerp will dispose of 6 miles' length of quay, having a depth of 30 to 40 feet of water. The docks, according to the anticipations of the Chamber of Commerce, only await completion to be immediately occupied by merchant vessels. The dock extension scheme in its entirety includes the construction of seven more subsidiary docks together with the canal dock, each in its turn one remove further from the deep-water entrance lock. The construction of the new entrance locks at Kruisschans, it is therefore urged, should be pushed forward with utmost expedition and connected by a deep-water channel with the subsidiary docks now under construction. The *Coupure* project (cf. *Journal*, vol. 34, p. 84) is still a matter of controversy between such experts as advise caution on the one hand, and others ambitious of an ideal port offering the largest shipping accommodation in the world.

ASIA.

Steam Navigation on the Upper Yang-tse.—The difficulties in the way of navigating the upper Yang-tse, from Ichang past the rapids and up to Chungking, seem at last in a fair way to be overcome. In order to establish a regular connection between those ports, the Sechuan Steam Navigation Company has placed on the river a twin vessel (built in England), consisting of a tug and a passenger and cargo boat, lashed together, the idea being that should the current prove too formidable at any time for both to ascend at once, the tug may proceed first, and, having anchored, haul the sister vessel through the rapids by means of a capstan. According to the *Tour du Monde* (No. 23, 1910), the first ascent of the rapids has been successfully accomplished without the use of this expedient, the whole distance between Ichang and Chungking being covered, including stoppages, in seven days.

AFRICA.

The Northern Mambukushu Country, Portuguese West Africa.*—The map at the end of this number has been constructed from surveys by Messrs. C. C. Bissett and J. W. Baker White, the latter of whom has sent us the following notes on the area covered by the journeys: "The Mambukushu people inhabit a considerable stretch of country, extending from the Mashi or Kwando river in the north to the Okavango in the south; but these notes are confined to the part about the Luiana river. Nominally they are subjects of King Lewanika, of Barotseland (one of whose sons lives at Kaunga), but in fact they own allegiance only to their own chief, Monkoya. They have a tradition that the tribe migrated from the neighbourhood of the Shiré about two generations ago. Beyond a general

* Map, p. 248.

similarity of construction, their language bears no resemblance to any of the languages given in the standard glossaries. They are generally of poor physique, and invariably very dirty. Their villages are rough and untidy. They grow a certain quantity of mealies, 'inzanti,' beans and peas, and tobacco, but there is never enough food to last the year, and for three months or so they live on bush-fruit, ground-nuts, and the pith of a certain kind of reed. They have but few cattle. The country is a flat, sandy tableland, with a gentle slope from west-north-west, cut up by rather narrow, swampy river-valleys. From July to January there is plenty of good pasture between the swamps and the bush, but it floods after the rains. The ground above the swamps is usually covered by rather stunted sandy forest, giving way gradually to open arid plains. The larger fauna includes elephant, rhinoceros, hippopotamus, giraffe, Burchell's zebra, and many kinds of antelope, besides the lion, leopard, and other carnivores. There do not seem to be any crocodiles in the Luiana or its tributaries. Of birds, guinea-fowls and francolins (three kinds) are most in evidence. Most of the natives carry muzzle-loading guns, which come through from the Portuguese. Consequently, most of the game has left the valleys and retired to the more arid back country. There are many Bushmen (local name, 'Ba-kwengu') in the forest—red people, living in small parties and building no huts, but living on game and wild produce. They are marvellous trackers, and usually much pleasanter people to deal with than the Mambukushu."

The Dune-belt of German South-West Africa.—Owing to the difficulties of travel across it, the belt of sand-dunes which runs for a long distance parallel to the coast of German South-West Africa, has remained in great part unknown ground until the present day. We lately referred (vol. 35, p. 80) to an exploring trip by Lieut. Trenk through a portion of this tract, along the bed of the Tsaukab river, and further explorations have been since carried out, both by this officer and others. In August, 1909, Lieut. Trenk crossed the dune-belt by two different routes, to the south and north of his former one (*Deutsches Kolonialblatt*, 1910, No. 6), and his report gives a vivid idea of the nature of the tract. On the westerly route, a little south of 25°, the expedition passed over a succession of level expanses, in part covered with grass, varied by mountainous elevations, before reaching the dune-belt proper. The first dunes were also grassed, but later they passed into a belt of drifting dunes of such a size as to make their passage an arduous matter, the steep crests of loose sand offering especial difficulties to the camels, and the death of the old bushman who acted as guide made matters worse. While the grass-covered dunes had a general direction from N.N.W. to S.S.E., the moving dunes formed an irregular complex of ridges and hollows. When the coast was at last reached, the descent of the steep dune face, nearly 200 feet in height, was excessively difficult, and the march northward along the shore was no less arduous, the steep face of the dunes approaching so near the sea that certain passages are possible only at low water. In spite of a forced march, some of the camels were overtaken by the tide and carried away by the surf. They had suffered much from the unwonted cold and damp, and were seized with a kind of collapse. Fresh water was found at points on the coast where an underground stream issues from the sand, and Lieut. Trenk has no hesitation in pronouncing the watering-place of Meob to be the debouchure of the Tsaukab. The return march inland was made just south of 24°, and proved even more arduous than the westward march. The dunes were higher and more difficult, being topped by almost vertical crests, and in the absence of land-marks it was difficult to keep the desired direction. No water was found, and the reports of native watering-places and encampments in this area are, in Lieut.

Trenk's opinion, quite unfounded. Reports of journeys by Captain von Rappard and Lieut. von Haxthausen in the region of dunes around the Tiras range, north-east of Lüderitzbucht, appear in No. 10 of the *Kolonialblatt*.

French Surveys in the Sahara.—Continuing his careful survey work in the Sahara (*Journal*, vol. 34, p. 682), Captain Cortier has filled in some gaps in the mapping of the region between the eastern Adrar and the bend of the Niger (*La Géographie*, May, 1910). The traveller had quite a small escort, and his work was somewhat hindered by the presence of raiding parties in the region traversed. One of his routes led across the isolated massif of Timetrin, west of that of Adrar, which it somewhat resembles, though on a smaller scale. Thence he continued west to Mabruk, the now ruined holy city of the Kuntas, and after a circuitous route through the Azauad to Arauan, ended the journey at Timbuktu. He was able to fix the positions of the most important points astronomically, thus securing a satisfactory framework for the cartography of this part of the Sahara. Journeys have also been made by French officers to the north and north-west of Timbuktu, into the desert area which still remains one of the least-known sections of the whole Sahara. Captain Grosdemanger, who has since unfortunately met his death in an encounter with a raiding party, went beyond Taodeni to Tahadje (or Teghazza), a point on Caillié's old route. Some particulars of the journey, obtained from Captain Grosdemanger before his death, are given by M. Chudeau in No. 1 of *L'Afrique Française* for the present year. From the extent of the ruins at Tahadje (referred to in the 'Tarikh es Sudan' as belonging to the Sonrai kingdom in the sixteenth century) its population must have once exceeded that of Timbuktu. Its houses were formed of blocks of salt, but its salt deposits are no longer worked, those of Taodeni being more favourably placed. Captain Grosdemanger's barometrical observations indicate the altitude of Taodeni as only about 250 feet above the sea, and other points as not much more. It will be remembered that the belief in an actual depression below sea-level in this region once led to somewhat wild schemes for the flooding of the Western Sahara.

The Duke of Mecklenburg's New Expedition.—The Duke of Mecklenburg, whose first journey across Africa has resulted in such valuable observations on the topography, geology, and natural history of the regions traversed, has started on a new expedition, accompanied, for the most part, by the same experts as co-operated with him during the earlier undertaking. He will enter West Africa by the Congo-Ubangi route to Lake Chad, and hopes to make his way to the Bahr-el-Ghazal through Southern Wadai and other borderlands of the Sudan. Although this is now not quite new ground, there is much still to be done to elucidate the scientific geography of the region, and valuable results may be anticipated from the journey.

Egypt and the Sudan in 1909.—In his lately issued Report (Egypt, No. 1, 1910), Sir E. Gorst notes, among other items, that, following on the high flood of 1908, the Nile had a marked rise in Egypt in May, 1909, and, thanks also to the contribution in June of the Assuan reservoir, a steady level was maintained during the weeks of lowest supply. A good summer supply was expected in 1910. The operations for thickening the Assuan dam were concluded. When the heightening of the dam is completed, the hope is held out of double the allowance of "summer" water for the Sudan, a prospect encouraging for land reclamation. A net increase of 432,590 feddans is recorded in the area of land returned as cultivated in the Sudan. Before the winter season of 1910–11, the surface waterworks for dealing with the rainfall in Cairo will, it is hoped, be finished. On the complete execution of the scheme approved in 1908, Cairo

will rank with the healthiest cities of the world. The railway was extended from Khartum to Wad Medani. The continuation of the line as far as Goz Abu Guma on the White Nile, and the construction of a bridge over the river at that point, are expected to be finished towards the close of 1910. The bridge spanning the Blue Nile at Khartum should be finished in a few months. The delimitation of the remaining gap in the Sudan-Abyssinian boundary was executed in the autumn. From the summit of the Birino mountain, the frontier runs to the source of a tributary of the Akobo, which it follows to its junction with the Akobo and thence along that stream to its confluence with the Pibor. Captain Kelly has drawn up an interesting report of the Beni Shongul country, through which he passed on his return from an expedition through south-west Abyssinia. Corrections have been made by Captain Coningham on maps of the northern portion of the Bahr-el-Ghazal province. The cadastral survey of the Blue Nile province should be finished in about four years' time. Survey work is also proceeding satisfactorily in the Halfa, Berber, and White Nile provinces, and in the town of Omdurman. The population of the Sudan is now roughly estimated at 2,400,000.

The Lado Enclave.—It has been officially announced in Parliament that the Lado Enclave, which, by the agreement with Belgium, was to revert to the Anglo-Egyptian Sudan six months after the death of King Leopold, was formally handed over to the Sudan authorities on June 16 last.

The Tunis-Tripoli Frontier, long a cause of dispute between the dwellers in its neighbourhood, and lately the scene of a collision between French and Turkish troops, has at last been definitely laid down by mutual agreement (*Globus*, July 7; *Tour du Monde*, July 9), the French claims being in the main conceded. Between Ras Adjir on the coast, and Jenneien, the line is so drawn as to leave Dehibat to Tunis, Wassen and the surrounding pasturages to Tripoli. Further inland Tunis secures the full possession of a caravan road towards Ghadames, together with the wells of Monteser, Kreshem el Hauja, and Tiaret, while those of Zar and Meshigig are shared by the two parties. It still remains to fix the Algeria-Tripoli frontier, on which the oasis of Janet forms the chief object of contention.

AMERICA.

Alaskan Glaciers.—Last year an expedition for the study of the glaciers of the Yakutat bay and Prince William sound region was carried out by Messrs. R. S. Tarr and L. Martin (assisted by a topographer, photographer, and others), under the auspices of the National Geographic Society of Washington.* A preliminary account of the expedition, profusely illustrated by photographs and sketch-maps, has been given by the leaders in the *National Geographic Magazine*, 1910, No. 1. The points to which special attention was directed were the changes that have lately taken place in the way of an advance or retreat of the glaciers. Prof. Tarr's former observations led him to the conclusion that the remarkable advance of certain glaciers between 1905 and 1906 was due to the unusual addition to them of ice and snow, as a result of the severe earthquake shocks to which the Yakutat bay region had been subject. Were this theory correct, it was to be expected (1) that other glaciers would, in the interval, have begun to show the effect of this glacier flood; (2) that those which had already been under its

* Prof. Tarr's previous work in Alaska in 1905 and 1906 has been referred to more than once in the *Journal*. The general results as regards the Yakutat bay region have lately been embodied in Professional Paper, No. 64, of the U.S. Geological Survey.

influence would begin to show signs of its diminution; and (3) that no such spasmodic changes would be noticeable in the regions outside the area of severe earthquake shaking. It is claimed that the results of last year's work in all cases support the theory previously propounded. While several of the glaciers examined still show no change, there are others which appear to have come under the influence of the flood. The largest of these, the tidal Hubbard glacier, was apparently just on the eve of advance. The Lucia glacier was so transformed as to be impassable: where in 1906 was a moderately sloping embankment of moraine-covered ice, there was, in 1909, an ice-precipice with jagged, serrated skyline. But the most astonishing transformation was that of the Hidden glacier, so called by Russell from being nearly hidden from view as he sailed up Russell fiord. In 1905 and 1906 it was a nearly stagnant, smooth-surfaced glacier, ending in a gently-sloping front 2 miles from the sea. In 1909 it had advanced almost to the sea, with a high and steep front, one of Prof. Tarr's previous photographic sites being covered by 500 feet of ice, while the surface had become profoundly crevassed. On the other hand, there were signs that the advance noted between 1905 and 1906 in the case of other glaciers had ended before the summer of 1907, while the glaciers of other districts were found to show no trace of recent spasmodic advance. Prof. Tarr makes some interesting remarks on the relationship between the glaciers and the human life of the district, the most striking being in the case of the Copper river valley. Here vast glaciers inpinge on the river from either side, causing ice-barriers and rapids. A railway is being built under these difficult conditions, and in order to find a passage, the daring project has been entertained of laying 5 miles of track *on the ice*. In this way the rich copper deposits to the north will be connected by rail with the growing port of Cordova. The glaciation of another Alaskan district, on the north side of the Wrangell mountains, is discussed by Mr. S. R. Capps in the *Journal of Geology*, 1910, No. 1. The crest of the range is occupied by a vast ice-cap, whence valley glaciers extend in all directions. There is evidence that formerly the glaciation was once much more extensive than at present.

Explorations in Saskatchewan.—The report of an exploration in Saskatchewan, from August 28, 1908, to January 6, 1909, by F. J. P. Crean, is published by the Department of the Interior, Canada. The tract covered by the report extends southwards from Churchill river to Prince Albert, and eastwards from Beaver river and Green lake to the eastern side of Stanley Mission, Lac la Rouge, and Montreal lake; an area of approximately 22,000,000 acres—3,000,000 occupied by river and lake, 19,000,000 by land. Within these limits excursions were made inland, where possible or desirable. Though not ready throughout for agricultural settlement, the whole tract is reported to be capable of producing large quantities of cereals, etc., and of supporting a large population. Its abounding swamps and muskegs should be easily remediable, while the opening of waterways navigable for small craft would not involve much labour. 5,000,000 acres only await survey to be ready for immediate settlement; 12,000,000 acres of swamp land are reclaimable at moderate expenditure; while eventually all the swamp will repay the cost of reclamation. A light loam with blue clay subsoil in the south-east, the soil towards the west is light loam with sandy clay subsoil. At La Loche lake the soil is a heavy loam from 18 inches to almost any depth. The low altitude and length of the day are prominent climatic factors. Prince Albert is 500 feet lower than Regina; Stanley, 260 feet lower still. The hours of sunshine on June 20 amounted at Prince Albert to 16 hours 42 minutes; at Portage la Loche to 17½ hours. The first frost registered was on October 2, with 24° Fahr. At Portage la Loche, 1677 feet high, on September 17, the garden was

untouched by frost. Beginning to freeze on October 20, the lakes still kept open for two weeks. The report includes observations on hay, animal life, fish, timber, minerals, as also a report by sections illustrated by sectional maps, and a table of temperatures taken at certain points from August 27 to October 27.

Major Fawcett's New Expedition in Bolivia. — Letters have been received from Major Fawcett from Tirapata, a station of the Inca Mining Company, on the road to Rio Tambopata. The date of writing is June 14. He says: "From Tirapata we go down the Inca Mining Company's road to Astillero or Puerto Markham. Then I shall get rid of half the animals, and proceed to cut through the forest to the mouth of the Heath. After fixing that position, we shall have to trace the Heath to its source; pass, if there is time, to the headwaters of the Madidi to explore the country; cut back across the country to the Tambopata; and from there I propose to ascend the Cordilleras on foot, with such members of the expedition as are still fit and strong, by way of the frontier line, sending the remainder back by an easy road, and thence to La Paz. We have the savages of the lower Heath to pass through first—very possibly the ugly dwarf Indians I was told about; but the savages of the upper waters, I believe, are entirely different, and somewhere in the Heath or Madidi sources are reputed to exist white bearded Indians (white Indians again!). I have an excellent party, if somewhat small, and I have no fear of any serious trouble. I expect to be at Puerto Markham about the end of June, and at the mouth of the Heath about the end of July or the beginning of September; at the source of the Heath about the middle of October, and up here again in November." The party with Major Fawcett consists of Captain Behrens, the doctor, one ex-subaltern of the army, two Bolivian officers (excellent fellows, he says), three non-commissioned officers, and two arrieros.

The Seasonal Distribution of Rainfall in South America.—The *Quarterly Journal of the Royal Meteorological Society* for January, 1910, contains a paper by William Gardner Reed on "South American Rainfall Types," the object of the study having been to make a map of the rainfall provinces of South America which should be as simple as possible and yet accurate enough for scientific presentation. Maps of the rainfall of South America on the basis of seasonal distribution have been drawn by Supan, Köppen, and Voss, the most accurate being that by Voss. The new map shows a wide area in the more central portion of Brazil where the data have been too scanty for representation. A series of curves illustrates the course of annual rainfall at various places in South America. At Bogota there are two maxima—in April and November; at Cayenne a maximum occurs in May; at Santiago there is a winter maximum in July; at Cordoba a summer maximum in December; and at Isola de los Estados and Buenos Ayres the rains are fairly uniform at all seasons.

Meteorology of Peru.—A paper by Dr. J. Hann, entitled "Zur Meteorologie von Peru" (*Sitzungsberichte der Kaiserl. Akademie der Wissenschaften in Wien, Mathem.-naturw. Klasse*, Bd. cxviii. November, 1909), deals with results of observations at meteorological stations in Peru. The stations are as much as possible so separated as to represent the different climatic regions of the country, and they comprise one on the summit of the volcano known as the Misti (near Arequipa), 5850 metres (some 18,000 feet) above the sea, which of course is only occasionally visited by members of the Arequipa observatory, but where, nevertheless, the self-recording instruments have furnished remarkably trustworthy records. The various meteorological elements, pressure, temperature, humidity, rainfall, etc., are discussed in full detail. At Lima, the capital of the Republic, the temperature is highest in February with a mean of 73°·4 Fahr., and lowest in

July and August with 60°·6 Fahr., and averages 66°·2 for the year, which are very low figures indeed for the tropical zone near sea-level. On the summit of the Misti the temperature at midday only rarely rises above the freezing-point and then only on perfectly clear days. In so dry a climate as Peru the snow-line is very high, attaining a height which is only equalled in a few parts of Tibet. In the wet season, the snows on the Misti and other mountains extend farther down and do not disappear so quickly as in the dry season. The coast of Peru has only a light drizzling rainfall from May to October; at Mollendo the rainfall is ·75 in. a year measured on 15 days, but further south, at Iquique, it is only ·2 in.; whilst in the centre of the Islay desert landwards from Mollendo no measurable rain falls. Farther landward, with increasing height, the rainfall becomes heavier, 5·6 in. on 24 or 25 days in the year falling at Arequipa. Here, as all over the highland region, the rain falls chiefly in the southern summer, especially between January and March. As in many tropical countries, it is very irregular in yearly distribution: thus while the mean fall at Arequipa is 5·6 in., in 1893 there were 11·9 in., and in the two following years only 2·8 in. On February 10, 1893, 4·2 in. fell, and on the 9th and 10th together, 5·5 in.; that is to say, nearly as much as falls in the whole of an average year.

AUSTRALASIA AND PACIFIC ISLANDS.

The British Expedition to Western New Guinea.—A further letter from Captain Rawling (cf. *ante*, p. 105), dated June 1, has been received at the Society. The expedition continues to meet with unexpected difficulties, though the various members of the party appear to have shown much pluck and determination in their efforts to cope with them. The steam launch that had been procured proved powerless to tow the canoes against the strong current of the rivers, and Captain Rawling was on his way to Dobo, with Mr. Goodfellow, to endeavour to buy a motor-boat from the pearl-fishers. The natives still proved of no assistance for transport purposes, and the pushing of stores up the Mimika by canoes had been tedious work, though the last batch of coolies engaged had been much more satisfactory than the first. The chief difficulty has arisen from the fact that the rivers all run at right angles to the desired line of advance towards Carstensz Top, considered by Captain Rawling to be much higher than the Wilhelmina Top, which was the objective of Mr. Lorentz (*Journal*, vol. 35, p. 725). While the height of the latter has proved to be less than 16,000 feet, Carstensz Top is now given as 18,000, though on what authority does not appear.* When trying to discover a route east from Tipue (see former note), Captain Rawling and Dr. Marshall discovered two fine rivers, the Tuaba and Kamura, but these too proved of little help. The crossing of these deep and rapid rivers and the cutting of paths through the dense jungle and swamps involve the most arduous work, and were it not for the amount of stores collected at Wakatimi it would have probably been the best course to try a new line of advance by some river more to the east. Captain Rawling hoped that in another month the whole expedition might reach the Kamura river, whence the first snows are only 20 miles distant, though the great snowfield and the main mass of Carstensz Top stretch another 20 miles beyond. Survey operations have been much impeded by climatic conditions, as well as

* The Posthumus Meijes Expedition of 1904 estimated the height of the western snow-peak (considered by it to be the highest point of the range) as 5100 metres or 17,000 feet of 0·3 metre (16,733 English feet). The name Carstensz Top is given in honour of the early Dutch navigator, Jan Carstenszoon (1623), who was the first to sight the snow in this part of New Guinea.

by the dense forests which clothe the whole country, and make the measuring of a base-line almost an impossibility. For three and a half months not a single view of the stars was obtained, but as at the time of writing the weather had improved somewhat, Captain Rawling hoped to obtain the necessary latitudes for mapping purposes. When trying to find a passage east of Wakatimi he succeeded in obtaining a grand view of all the mountains, enabling him to fix the main positions satisfactorily. It is evident that he is doing the utmost possible to carry out his task. The health of the party has been fair, considering the climate, though one of the collectors has been invalided to Australia. It is reported that a rival Dutch expedition is also endeavouring to reach Carstensz Top, from a starting-point further east.

Surveys in New Zealand.—The official report for 1908–9, by Mr. T. Humphries, records the completion in the field of 416 square miles of minor triangulation in different districts, though the mapping of 162 square miles awaited completion. The need for a major triangulation, such as, leaving out of account its immense value otherwise, would serve to link up and bring into adjustment the numerous groups of uncontrolled minor work executed on obsolete standards of length, is again emphatically urged. Over the 200 miles from Wellington to 70 miles north of New Plymouth permanent signals have been erected, and, with a few exceptions, the angular work has been completed over 10,000 square miles of country. To make that work available for control of the minor triangulations covering the area, all that is lacking is the measurement of the bases, together with a comparatively small residuum of instrumental work. Owing to its unfavourable conformation and density of forest, the sides of the triangles in the Taranaki district are restricted to 10 to 12 miles in length. After suspension for six years, the work in this section has been resumed, and a base a little over 8 miles long measured at the south end, in the Wairarapa. Only forty-six earthquakes were recorded at Christchurch in 1908–9, and Mr. H. F. Skey suggests that their lessening frequency may be connected with the increase of volcanic activity in different parts of the world. Down to the end of 1908–9 the stations at which magnetic observations had been made in the dominion numbered 309. A useful piece of work, dealt with in Appendix III. of the Report, has been the determination of the mean sea-level at six different parts from the tide-gauge records, and its reference to permanent bench-marks on the adjacent shores. The gauge charts at Wellington harbour were found to exhibit instances of very pronounced seiche-oscillations.

POLAR REGIONS.

German Antarctic Expedition.—Particulars have already appeared in the *Journal* (vol. 35, pp. 455, 600) of Lieut. Filchner's original plans for a German expedition to the Antarctic Regions. During July, Lieut. Filchner paid a brief visit to this country for the purpose of conveying to Captain Scott the good wishes of the Berlin Geographical Society, and of discussing both with Captain Scott and with Dr. W. S. Bruce the best means of co-ordinating the work of the British, and the proposed Scottish and German expeditions. He has abandoned the idea of sending a subsidiary expedition to the Ross sea, and his whole force will be concentrated on the advance southwards through the Weddell sea. He estimates the cost of the expedition at about £50,000, and is confident of being ready to start in April next. A Norwegian sealer, the *Björn*, which has been employed in the Weddell sea region, has been purchased, and a number of the ship's officers and scientific staff have been selected. Both the captain and the first officer have had previous Antarctic experience. The scientific staff will number eleven members, and the research work undertaken

will be of a very comprehensive character. With the object of gaining some experience of polar travel, Lieut. Filchner has started on a trip to Spitsbergen, in the course of which he hopes to cross the main island.

MATHEMATICAL AND PHYSICAL GEOGRAPHY.

The Chemistry of Oceanic Red Clay.—At the suggestion of Sir John Murray, chemical investigations into the nature and composition of Red Clay have been carried out in the Challenger Laboratory, Edinburgh, and the results are set forth and discussed in the *Proceedings of the Royal Society of Edinburgh* (vol. **30**, pp. 183–201) by Dr. W. A. Caspari, F.I.C. Red Clay has been shown by Murray to be produced mainly by the decomposition in the sea itself of the pumices and other volcanic minerals with which the deepest parts of the ocean are strewn. Wherever the depth exceeds 2000 fathoms, Red Clay may be found all over the ocean, generally bordering on and merging into Globigerina Ooze deposits; it covers a total area of 51 million square miles, being in the Pacific the chief deposit, but occurring in the Atlantic and Indian oceans principally as patches in the Globigerina Ooze. Typical Red Clays should not contain above 20 per cent. of carbonate of lime. Both macroscopically and microscopically, Red Clay is far from homogeneous, containing various admixtures, but these are quite inconsiderable in quantity in comparison with the matrix itself, to which, in regard to the chemical analyses, the term "Red Clay" is applied. Analyses of various clays from different parts of the ocean were made, and the samples were prepared for analysis by being deprived of calcium carbonate, and, as far as possible, of coarse minerals and sea-salts. Some of the more interesting characteristics of the substance may be here mentioned: (1) All Red Clays are composed of two chemically distinct ingredients, viz. hydrated amorphous silicates of an argillaceous character, imparting to the material its characteristic consistency, and finely divided anhydrous silicates, partly vitreous and partly crystalline, representing what is left of the mother-substances of the former. (2) Red Clay does not differ in general physical properties from terrestrial clay. (3) Clay-substance is of a *colloidal* as distinct from a *crystalloid* character. (4) Although consisting mainly of alumina and silica, a hard-and-fast chemical composition cannot be attributed to clay-substance. The term "clay" therefore bears a physical rather than chemical signification. (5) Red Clay is found to be composed mainly of silica, alumina, ferric oxide, and water. (6) These hydrous silicates are to be regarded, not as definite chemical compounds or mixtures of such, but as agglutinates of colloidal silica, alumina, etc., in inconstant proportions. (7) Red Clay is a typical degradation-product of igneous minerals under submarine weathering. (8) The origin of the iron in the Red Clays of the southern hemisphere, where the mother-substances are highly ferruginous, is evident, but of that in the clays of the northern hemisphere, where the mother-substances contain less iron than the clay itself, is more difficult to account for, and must probably be sought in the transport by rivers, from land to sea, of iron salts in solution.

Danish Oceanographical Expedition.—Dr. Johs. Schmidt, already well known for his biological work in North Atlantic waters, lately started in the *Thor* on a cruise for oceanographical work, accompanied by various specialists. The area investigated first, at the expense of the Danish Government, has been that portion of the North Atlantic between Iceland and the Færoes, but it is hoped to extend the voyage to the Mediterranean, funds for this purpose having been provided from unofficial sources.

GENERAL.

The Late Lieut. Boyd Alexander.—A scheme has been set on foot for the

erection of a memorial to the late Boyd Alexander, and to his brother, Captain Claud Alexander, in the parish church at Cranbrook, Kent, which had always been the home of the brothers; and a committee has been formed, with the Earl of Cranbrook as chairman, to carry it out. Subscriptions may be paid to the fund at the London, County and Westminster Bank at Cranbrook, or to the Hon. Secretary, Canon Bell, the Vicarage, Cranbrook. The Council of the Society has decided to subscribe £5 5*s.* to the fund. Further details of the traveller's murder have been received through Reuter's agency, having been obtained by Lieut. Childers Thompson, in charge of the British station at Maifoni, in Bornu. They only add, if that be possible, to the regret at the lamentable occurrence, the murder having been due, not to any settled hostility on the part of the native ruler, but to a sudden fracas which arose without definite cause. Having, on the evening of his arrival, been summoned to the presence of the chief of Dar Tama, a district on the western frontier of Darfur, the explorer replied that he would visit him the next morning. A crowd, however, assembled with a view of taking him before the king, and when he resisted, a small boy seized a gun and fired at him, whereupon he fell and was killed by the bystanders. Only two days later an escort arrived from Ali Dinar of Darfur to forward the traveller on his way. The sad occurrence emphasizes the importance of promptly establishing the authority of the Sudanese Government over Darfur, and of delimiting the frontier with the French sphere.

Memorial to Hakluyt at Bristol. — The idea of commemorating the chronicler of early English voyages, so long connected with Bristol as prebendary at its cathedral, by a suitable memorial to be erected therein, is due to Canon Talbot, of that city, through whose zeal and energy in the matter the required funds have been got together. An interesting ceremony took place on July 7 at the unveiling of the memorial, which has the form of an inscribed tablet fixed at the east end of the north choir aisle. A number of distinguished visitors were present, including Sir Clements Markham, who gave an interesting address setting forth the main points in Hakluyt's career. The Society has contributed to the cost of the memorial.

OBITUARY.

Mr. John Coles.

At his residence in the quiet little village of Liphook, Hants, where he had lived for ten years in peaceful retirement, there passed away on June 24, in the seventy-eighth year of his age, one whom many Fellows and friends of this Society will remember with sincere respect—Mr. John Coles, for twenty-three years the Society's Map Curator and Instructor in Practical Astronomy and Surveying. During his long term of faithful service he won the high esteem of all those seeking advice and information in geographical matters, so although ten years have elapsed since, through failing health, he was compelled to resign his position at the Society, it is not surprising that his name and memory are still held in the greatest possible regard.

Up to the time of his connection with the Society he had spent a most adventurous life. There were few parts of the world that he had not visited at some time or another, and many were the interesting experiences he had to relate.

John Coles was the son of a city merchant, the late Charles Coles, afterwards of Tunbridge Wells, and was born in London, February 18, 1833. After early school-days were over, at the age of fourteen he joined the Royal Navy, and from that time his adventures commenced, and he entered upon a career to which he was

eminently suited by nature. As quite a lad he served on the West Coast of Africa, and on the Brazilian and Pacific stations. The events in which he was called to take a prominent part, at this early age, would, if recorded, make an interesting volume which many a boy would revel in. Take one instance only, one example. The slave trade was rife in those days, and he was placed in charge of a boat's crew at the mouth of the Congo to watch for slavers. After hiding for some time amongst the thick grass in the backwaters, a vessel with a freight of imprisoned human beings was at length seen stealthily coming down the river. Without any hesitation, young Coles brought his little boat close up under her, boarded her with his men, and himself led a hand-to-hand fight, which resulted in the capture of the slaver and the release of the slaves. This and many suchlike incidents he would relate in a matter-of-course way with the greatest modesty. His powers as a navigator were soon brought to the test, for when still but a boy he had occasion to take a small vessel across the Atlantic from the African coast to South America. This he accomplished successfully by sailing as near as he could along a parallel of latitude, after passing down the African coast to the latitude of the South American port. Perhaps this was not the shortest way, but, as he used to say, it was the best he could think of at the time, and the surest for him, as he only had to take latitude observations and keep a good look-out. At the outbreak of the Russian war he was called to take part in the operations in the Baltic, and it was during an engagement here that he had the misfortune to lose the sight of an eye, through the explosion of a shell. After a further short time of service in the West Indies, Mr. Coles left the navy, and in 1857 settled in British Columbia, which he had already visited as a midshipman on H.M.S. *Thetis*. Here the next nine years of his life were spent—years of healthy toil and adventure as a pioneer settler, alternating between losses and successes. The record of this period and the experience passed through as gold prospector, trader, farmer, not to mention other positions held at times, would be most valuable, specially as it would refer to a time passed away for ever. Frequently hundreds of miles lay between the settler and any other civilized man, and for months together he slept in the open without a roof over his head. At one period he was a trader with the Indians and Hudson Bay Company in furs and skins, and it was at this time that he had one of the narrowest escapes of his life. An Indian chief, who had for some reason become unfriendly, brought a number of his men down to the little store where he lived and kept his furs, with the idea of murdering him and robbing him of his possessions. No assistance was available, and the situation was most critical. However, with the ready resource which always characterized him, Mr. Coles, unnoticed, threw a piece of meat, upon which he had placed strychnine to kill foxes, upon the ground, which was immediately greedily devoured by the chief's dog. Then, turning in the coolest possible manner to his uninvited guest, he told him that if he dared to kill him he would himself die, and to show his mysterious power to kill, his dog would drop down dead before his eyes. At this the chief laughed, but when, almost directly after, the animal rolled over and expired, he was filled with alarm, and fell down on his knees and begged for mercy.

During the latter part of his life in British Columbia Mr. Coles settled upon land he had taken up at Saanich, on Vancouver island, and Cole bay, on Saanich arm, was named after him by Captain Richards in 1860. Whilst residing on Vancouver island he served as member for Saanich in the first Legislative Assembly at Victoria.

In 1866 Mr. Coles left British Columbia for the last time, and after doing valuable work in connection with submarine cable laying in the Indian ocean, during which he was instrumental in inducing the Governments of Cape Colony and Natal

to subsidize the cable to Aden, his eventful travels were over, except for a holiday trip across Iceland, which he made in 1881 in the company of the late Sir Cuthbert Peek and Mr. Delmar Morgan, the record of which he published in his 'Summer Travelling in Iceland.' In 1877 he was appointed Map Curator to the Royal Geographical Society. The following year the course of instruction in surveying for intending travellers was inaugurated, and Mr. Coles was given the additional post of instructor. During the first year only thirteen travellers passed through his hands, but such was the success of this scheme that when he left, twenty-two years later, the number for the year was forty-nine. Not the least valuable service he rendered to explorers during his term of service for the Society was the revising of several editions of the 'Hints to Travellers.'

In addition to his duties at the Society, from 1884 to within a few months of his death, Mr. Coles was "Travel Editor" of the *Field* newspaper, in which position he succeeded the late Mr. E. C. Rye, a former well-known librarian of the Society. From his varied experience gained during his extensive travels, and his training in nautical astromony as a naval officer, he was exceptionally well fitted for the posts he eventually occupied, and as a practical instructor of explorers, specially in those times of pioneering work, he was exactly the right man in the right place, as many can still testify.

A born leader, courageous and fearless, plain speaking and just, he commanded the respect of all. But it was only those who were privileged to be intimately acquainted with him who could fully appreciate his sterling value. A lover of the right, he was ever alert to protest against the wrong done to others. Moved by a heart full of tender kindness and pity, he was always ready to lend a helping hand to those needing his assistance.

He was a Fellow of the Royal Astronomical and Royal Geographical Societies, was twice married, his first wife being Mary, the daughter of John Harcus, of Kirkwall, and his second, who is still living, Emma Anne, daughter of John Flintoff, of London. Two daughters and a son survive him. For many years Mr. Coles resided at Mitcham, Surrey, but latterly he had made his home at Liphook, in Hants, near to which place, in the picturesque little churchyard of Bramshott, he was laid to rest on June 28. E. A. R.

MEETINGS OF THE ROYAL GEOGRAPHICAL SOCIETY, SESSION 1909-1910.

Eighteenth Meeting, June 20, 1910.—Major Leonard Darwin, President, in the Chair.

Elections.—*A. F. M. Abdul Ali; Sir William Bailey; George Arthur Bone; Dr. J. C. Bowker; Spencer Harcourt Butler; Francis T. Colby; E. G. M. Dupigny; Henry Percival James; J. W. B. Maclaren; Henry Rupert Marsden; Gerard Stewart Delmar Morgan; Thomas Hewitt Myring; Frederic A. G. Pape; H. S. G. Peacock; George Wright Peavey; Francis Powell; Hugh Edward Poynter; Herbert G. Robins; Frederick Ross Thomson; Captain J. L. Sleeman; James Austin Wilder; G. C. Williams, R.E.; W. Perceval Yetts, R.N.*

The paper read was—

"Features of Alpine Scenery due to Glacial Protection." By Prof. E. J. Garwood.

GEOGRAPHICAL LITERATURE OF THE MONTH.

Additions to the Library.

By EDWARD HEAWOOD, M.A., *Librarian*, R.G.S.

The following abbreviations of nouns and the adjectives derived from them are employed to indicate the source of articles from other publications. Geographical names are as a rule written in full:—

A. = Academy, Academie, Akademie.
Abh. = Abhandlungen.
Ann. = Annals, Annales, Annalen.
B. = Bulletin, Bollettino, Boletim.
Col. = Colonies.
Com. = Commerce.
C.R. = Comptes Rendus.
E. = Erdkunde.
G. = Geography, Géographie, Geografia.
Ges. = Gesellschaft.
I. = Institute, Institution.
Iz. = Izvestiya.
J. = Journal.
Jb. = Jahrbuch.
k.k. = kaiserlich und königlich.
M. = Mitteilungen.
Mag. = Magazine.
Mem. (Mém.) = Memoirs, Mémoires.
Met. (mét.) = Meteorological.
P. = Proceedings.
R. = Royal.
Rev. (Riv.) = Review, Revue, Rivista.
S. = Society, Société, Selskab.
Sc. = Science(s).
Sitzb. = Sitzungsbericht.
T. = Transactions.
Ts. = Tijdschrift, Tidskrift.
V. = Verein.
Verh. = Verhandlungen.
W. = Wissenschaft, and compounds
Z. = Zeitschrift.
Zap. = Zapiski.

On account of the ambiguity of the words *octavo*, *quarto*, etc., the size of books in the list below is denoted by the length and breadth of the cover in inches to the nearest half inch. The size of the *Journal* is 10 × 6½.

A selection of the works in this list will be noticed elsewhere in the "Journal."

EUROPE.

Alps—Guide-book. **Coolidge.**

Conway and Coolidge's Climbers' Guides. The Bernese Oberland. Vol. I. From the Gemmi to the Mönchjoch. Part 2. The Groups N. and S. of the Main Range. A new edition, by W. A. B. Coolidge. London: T. F. Unwin, 1910. Size 5 × 3½, pp. xxiv. and 214. *Price* 10*s*. *Presented by the Publisher.*

These guides have gained too established a position to need lengthy notice. This volume has been entirely rewritten for the present edition, and its plan is now identical with that of the later issues of the series.

Belgium—Hydrology. **Van den Broeck, Martel, and Rahir.**

Les cavernes et les rivières souterraines de la Belgique, étudiées spécialement dans leurs rapports avec l'hydrologie des calcaires et avec la question des eaux potables. Par E. van den Broeck, E. A. Martel et Ed. Rahir. 2 vols. Brussels: H. Lamertin, 1910. Size 10 × 6½, pp. xxiv., 1592, xl., 92, and lxviii. *Map*, *Illustrations*, *and Sections*. *Price* 20*s*.

Danube. *C.R. IX^e Congrès Internat. G. Genève* 1908 (1909) **1**: 446–463. **Porumbaru.**

La Commission européenne du Danube. Par Emmanuel Porumbaru.

Denmark—Geology. **Ussing.**

Handbuch der regionalen Geologie herausgegeben von Prof. Dr. G. Steinmann und Prof. Dr. O. Wilckens. 1 Band, 2 Abteilung. Dänemark. Von D. N. V. Ussing. Heidelberg: Carl Winter, 1910. Size 10½ × 7, pp. 38. *Sketch-maps and Sections.*

The first part issued of a comprehensive work on the regional geology (including a good deal of physical geography) of the world, to be completed in 8 volumes. The separate sections are to be written by well-known experts.

Europe—Alpine Lakes. *Riv. G. Italiana* **16** (1909): 414–419. **Marinelli.**

A proposito dei laghi più elevati d'Europa. Di Olinto Marinelli.

Europe—Ethnography. **Feist.**

Quellen u. Forschungen, alten Geschichte u. G. (Sieglin), No. 19 (1910): pp. 70.

Europa im Lichte der Vorgeschichte und die Ergebnisse der vergleichenden indogermanen Sprachwissenschaft. Ein Beitrag zur Frage nach den Ursitzen der Indogermanen. Von Siegmund Feist.

Europe—Geodesy. **Börsch.**

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Europe—Meteorology. *Petermanns M.* **56** (1910): 5–7. **Alt.**

Die geographische Verteilung der Gewitterhäufigkeit in Kontinental- und Nordeuropa. Von Dr. E. Alt. *Map.*

France. **Neuse.**

Landeskunde von Frankreich. Von Dr. Richard Neuse. 2 vols. (Sammlung Göschen: 466. und 467. Bändchen.) Leipzig: G. J. Göschen, 1910. Size 6 × 4, pp. (vol. 1) 140; (vol. 2) 146. *Maps, Illustrations, and Sections. Price (each)* 80 *pfg. Presented by the Publishers.*

The same writer brought out, a few years ago, an excellent sketch of the geography of the British Isles.

France—Basses Alpes. *Ann. G.* **17** (1908): 395–403. **Martel.**

Le profil en long du Grand Cañon. Par E.-A. Martel. *Diagram and Illustrations.*

France—Bouches-du-Rhône. *B.G. hist. et descriptive* (1909): 125–139. **Barré.**

L'immigration française dans les Bouches-du-Rhône et l'émigration de ce département dans les autres circonscriptions metropolitaines. Par H. Barré.

France—Central. **Ardouin-Dumazet.**

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De Mons-la-Trivalle à Hérie par les gorges. Par Raymond Nauzières. *Illustrations.*

France—Coast-erosion. *M.G. Ges. Hamburg* **24** (1909): 193–284. **Zahn.**

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France—Eastern. *Petermanns M.* **55** (1909): 337–340, 389–390. **Immanuel.**

Ostfrankreich in militärgeographische Hinsicht. Von Frederick Immanuel. *Map.*

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Richesse minière de l'Hérault. Par L.-Fernand Viala.

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Fleuves et rivières de France. Étude sur les documents réunis par l'Administration des Ponts et Chaussées. Par Anthoine Vacher.

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France—Meteorology. *B.S. Languedoc. G.* **32** (1909): 135–157. **Martonne.**

Contribution à l'étude de la vent d'autan. (Deuxième note.) Par E. de Martonne. *Sketch-map and Diagrams.*

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France—Natural Regions. **Vidal de la Blache.**

Régions naturelles et noms de pays (Revue). Par P. Vidal de la Blache. (Extrait du Journal des Savants, Septembre–Octobre, 1909.) Paris, 1909. Size 10½ × 8½, pp. 20.

A discussion of Prof. Gallois's work on this subject.

France—Oyster Industry. **Guérin-Ganivet.**

B.I. Océanogr. Monaco, Nos. 154 and 155 (1909): pp. 16 each.

Notes préliminaires sur les gisements de mollusques comestibles des côtes de France. L'île aux Moutons et l'archipel des Iles de Glénan. Par J. Guérin-Ganivet. La côte morbihannaise de la rivière d'Etel à l'anse de Kerguelen. By the same. *Maps.*

France—Paris. *Deutsches Rundschau* **32** (1910): 159–165. **Schmidt.**
Die Citybildung in Paris während des 19. Jahrhunderts. Von Dr. Hermann Schmidt. *Plan.*

France—Saône-et-Loire. *B.G. hist. et descriptive* (1909): 27–36. **Porte.**
Note sur les causes du tracé des cours d'eau aux environs d'Autun. Par P. Porte. *Diagram.*
Traces the influence of geological structure.

France—Sheep. *La G., B.S.G. Paris* **20** (1909): 357–367. **Perruchot.**
Le mouton de France et ses produits. Par L. Perruchot. *Sketch-map.*
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France—South. **Ardouin-Dumazet.**
Ardouin-Dumazet. Voyage en France. 34e Série: Velay—Bas-Vivarais—Gévaudan (causses et gorges du Tarn) (pp. 394); 35e Série: Rouergue et Albigeois (pp. 360). Paris, etc.: Berger-Levrault et Cie., 1904. Size 7½ × 4½. *Maps. Price (each)* 3.50 *fr.*
These volumes form part of a topographical description of the whole of France.

France—South-East. *B.S.G. Marseille* **32** (1908): 103–109. **Janet.**
En Provence: géographie comparée à travers le paysage. Par Armand Janet. *Sketch-map.*

France—Tours. *B.G. hist. et descriptive* (1909): 37–47. **Chauvigné.**
Topographie de la plaine de Cæsarodunum. Par Auguste Chauvigné. *Plan.*

Germany—Ethnology. *Deutsche Erde* **8** (1909): 234–239. **Pessler.**
Deutsche Ethno-Geographie und ihre Ergebnisse, soweit sie kartographisch abgeschlossen sind. Ein Beitrag zur deutschen Ethnologie. Von Dr. Willi Pessler. *Map.*
The map shows the ethnographic boundaries as based on physical characteristics, language, and house-types.

Germany—Hanover. **Olbricht.**
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Grundlinien einer Landeskunde der Lüneburger Heide. Von Dr. Konrad Olbricht. *Sketch-maps and Illustrations.*
A former paper on this subject by the same author was noticed in vol. **31**, p. 562.

Germany—Lübeck basin. *Globus* **96** (1909): 309–314. **Spethmann.**
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Southern Germany (Würtemberg and Bavaria). Handbook for travellers. By Karl Baedeker. 11th edit. Leipzig (London: T. F. Unwin), 1910. Size 6½ × 4, pp. xxx. and 364. *Maps and Plans. Price* 6*s. Presented by the Editor.*

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Le climat de l'Attique. Par D. Eginitis.

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On a long-period variation in the height of the ground-water in the dunes of Holland. By Prof. Eug. Dubois.

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Nederland als mijnbouwland. Door Dr. P. Tesch. *Sketch-map.*

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Un profilo morfologico attraverso l'Appennino. Del dott. Ludomiro Cav. di Sawicki. *Sketch-maps and Illustrations.*

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L'Agonia di Messina. Cento Illustrazioni da fotografie di Emidio Agostinoni,

Giacomo Brogi e Mario Corsi. Del Emidio Agostinoni. Rome, [*n.d.*, 1909.] Size 9½ × 6½, pp. 64. *Illustrations. Presented by the Author.*

A valuable collection of photographs showing the effects of the earthquake, with letterpress.

Italy—Earthquake. **Mercalli.**

Reale Istituto d'Incoraggiamento di Napoli. Prof. Giuseppe Mercalli. Contributo allo studio del terremoto Calabro-Messinese del 28 Dicembre 1908. Naples: Detken & Rocholi, 1909. Size 11½ × 8, pp. 46. *Map and Illustrations. Presented by the Author.*

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Italy—Relief. *Riv. G. Italiana* **16** (1909): 1–26. **Sawicki.**

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Materiali per lo studio dei fiumi italiani. I. Le regione a spartiacque incerto od indeterminato dei baccini dell' Arno e del Serchio. Studio di G. Canestrelli. *Maps.*

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Intorno alla Carta della Sicilia (1719–21) di Samuele di Schmettau. Di Paolo Revelli.

Italy—Sicily—Etna. *B.S.G. Italiana* **10** (1909): 221–250, 369–400. **Buscalioni.**

L'Etna e la sua vegetazione con particolare riguardo alla genesi della Valle del Bove. Del Prof. Luigi Buscalioni. *Illustrations.*

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Materiali per lo studio dei fenomeni carsici. I. Il Colle del Montello. Di A. R. Toniolo. *Sketch-maps and Sections.*

Italy—Vesuvius. *Riv. G. Italiana* **16** (1909): 262–272. **Toniolo.**

Studio orometrico sulle variazioni del cono vesuviano dopo l'eruzione del 1906. Di Antonio Renato Toniolo.

Italy—Waterways. *B.S.G. Italiana* **10** (1909): 37–49, 113–122. **Baratta.**

La navigazione interna alla Mostra del Po di Piacenza. Del Mario Baratta.

Mediterranean—Currents. *Riv. G. Italiana* **16** (1909): 347–363. **Marinelli.**

Sulla corrente litorale nel Golfo di Genova. Di O. Marinelli.

Montenegro—Railway. **Havass.**

Földrajzi Közlemények, B.S. Hongroise G. **37** (1909): 20–35.

Antivari und die neue Montenegrinische Bahn. (Ungarns Interessen an der Adria.) Von Dr. Rezsö Havass. *Illustrations.*

Norway and Sweden. **Kelynack.**

Scandinavian winter health resorts. By Dr. T. N. Kelynack. London: St. Catherine Press, 1910. Size 8½ × 5½, pp. viii. and 114. *Maps and Illustrations. Price* 1*s. net. Presented by the Publishers.*

Spain. **Cayley.**

The Bridle roads of Spain, or Las alforjas. By George John Cayley. 3rd edit. With an Introduction by Martin Hume. London: T. F. Unwin, 1908. Size 8 × 5, pp. 398. *Portrait. Price* 7*s.* 6*d. net. Presented by the Publisher.*

Spain—Galicia. **Wood.**

A corner of Spain. By Walter Wood. With an Introduction by Martin Hume. London: E. Nash, 1910. Size 7½ × 5, pp. xii. and 204. *Illustrations. Price 5s. net. Presented by the Publishers.*

United Kingdom—Buckinghamshire. **Shorter.**

Highways and Byways in Buckinghamshire. By Clement Shorter. With illustrations by Frederick L. Griggs. London: Macmillan & Co., 1910. Size 8 × 5, pp. xx. and 344. *Map and Illustrations. Price 6s. Presented by the Publishers.*

The human side has intentionally been allowed to preponderate in this volume.

United Kingdom—Cornwall. **Baring-Gould.**

Cambridge County Geographies (edited by F. H. H. Guillemard). Cornwall. By S. Baring-Gould. Cambridge: University Press, 1910. Size 7½ × 5, pp. x. and 164. *Maps, Illustrations and Diagrams. Price 1s. 6d. Presented by the Publishers.*

United Kingdom—Devonshire. **Knight.**

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China—Yunnan. **Little.**

Across Yunnan: a journey of surprises. Including an account of the remarkable French Railway Line now completed to Yunnan-fu. By Archibald Little. London: S. Low & Co., 1910. Size 7½ × 5, pp. 164. *Sketch-map and Illustrations. Price 3s. 6d. net. Presented by Mrs. A. Little.*

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French Indo-China—Annam. **Parmentier.**

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India—Himalaya. *B.S.G. Italiana* IV. 11 (1910): 435–469. **Abruzzi.**

Esplorazione nei monti del Karakoram. Di S. A. R. Luigi Amedeo di Savoia, Duca degli Abruzzi. *Map and Illustrations.*

India—Himalaya. **Kennion.**

Sport and life in the further Himalaya. By Major R. L. Kennion. Edinburgh and London: W. Blackwood & Sons, 1910. Size 8½ × 5½, pp. xii. and 330. *Illustrations. Price 12s. 6d. net. Presented by the Publishers.*

India—Historical. **Foster.**

The English factories in India, 1630–1633. A calendar of documents in the India Office, Bombay Record Office, etc. By William Foster. Oxford: Clarendon Press, 1910. Size 9 × 6, pp. xl. and 354. *Illustration. Price 12s. 6d. net. Presented by the Secretary of State for India.*

Mr. Foster here continues his useful *précis* of documents in the India Office, with a valuable introduction outlining the course of events in the period concerned.

India—North-West Frontier. **Enriquez.**

The Pathan borderland, a consecutive account of the country and people on and beyond the Indian frontier from Chitral to Dera Ismail Khan. By C. M. Enriquez. Calcutta, etc.: Thacker, Spink & Co., 1910. Size 7½ × 5, pp. 144. *Sketch-map. Presented by the Author.*

India—Survey. **Burrard.**

Synopsis of the results of the operations of the Great Trigonometrical Survey of India, vol. 35. Descriptions and co-ordinates of the principal and secondary stations and other fixed points of the North-East Longitudinal Series of Triangulation (or Series I. of the N.-E. quadrilateral). Prepared under the direction of Colonel S. G. Burrard. Dehra Dun, 1909. Size 12 × 9, pp. xx., xlvi., and 520. *Index-map and separate volume of maps. Presented by the Government of India.*

Japan. **Ponting.**

In Lotus-land: Japan. By Herbert G. Ponting. London: Macmillan & Co., 1910. Size 10 × 7, pp. xvi. and 396. *Illustrations. Price* 21*s. net. Presented by the Publishers.*

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A journal from Japan: a daily record of life as seen by a scientist. By Dr. Marie C. Stopes. London: Blackie & Son, 1910. Size 9 × 6, pp. xiv. and 280. *Illustrations. Price* 7*s.* 6*d. net. Presented by the Publishers.*

Persia. **Grothe.**

Wanderungen in Persien. Erlebtes und Erschautes von Hugo Grothe. Berlin: Allgemeiner Verein für Deutsche Literatur, 1910. Size 8½ × 6, pp. viii. and 366. *Illustrations. Price* 6*m. Presented by the Publishers.*

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Persia in revolution, with notes of travel in the Caucasus. By J. M. Hone and Page L. Dickinson. Dublin: Maunsel & Co. (London: T. Fisher Unwin), 1910. Size 7½ × 5, xiv. and 218. *Sketch-map and Illustrations. Price* 5*s. net. Presented by the Publishers.*

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Klimatafeln aus Persien. Von General A. Houtum-Schindler.

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Russia—Caucasus—Place-names. **Hahn.**

Erster Versuch einer Erklärung kaukasischer geographischer Namen (zirka 2000). Von C. von Hahn. Stuttgart: Strecker & Schröder, 1910. Size 9½ × 6½, pp. viii. and 62. *Price* 3*s.*

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Russia—Siberia—Sakhalin. **Ahnert.**

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Geologische Untersuchungen an der Ost-Küste des Russischen Sachalins im Jahre 1907. Von E. v. Ahnert. *Map, Illustrations, and Diagrams.* [In Russian, with German *résumé*.]

Russia—Siberia—Yakutsk. **Obrucheff.**

V. A. Obrucheff. The basin of the Nakatam and its gold mines. (Compiled from official sources.) Tomsk, 1909. Size 9½ × 6½, pp. 48. *Map.* [In Russian.] *Presented by the Author.*

Russian Central Asia. *B.S.G. Marseille* **33** (1909): 235–256. **Gourdet.**

De Vernyï à l'Yssyk-Koul (Turkestan russe). Par Paul Gourdet.

Siam. *Travel and Exploration* **3** (1910): 145–153. **Forbes.**

Some recollections of the Siamese-Malay Peninsula. By Edmund Forbes. *Illustrations.*

South-East Asia—Languages. **Brandstetter.**

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Tian-Shan. *Abh. K.A.W. München* **24** (1909): 341–384. **Gröber.**

Aus den wissenschaftlichen Ergebnissen der Merzbacherschen Tian-Schan Expedition. Carbon und Carbonfossilien des nördlichen und zentralen Tian-Schan. Von Paul Gröber. *Illustrations.*

Turkey—Archæology. *P.S. Biblical Archæology* **32** (1910): 41–54. **Pinches.**
The Discoveries by the German Expedition on the Site of Aššur. By Theophilus G. Pinches.

Turkey—Asia Minor. *Petermanns M.* **55** (1909) : 169–177, 216–223, 264–269. **Diest.**
Quer durch Karien. Von W. v. Diest. *Maps, Plan, and Illustrations.*

Turkey—Asia Minor. *Petermanns M.* **55** (1909): 25–34. **Herzfeld.**
Eine Reise durch das westliche Kilikien im Frühjahr 1907. Von Dr. E. Herzfeld. *Map.*

Turkey—Asia Minor—Irrigation. *B.S.G. Italiana* **10** (1909): 123–128. **Theodoli.**
Alcuni cenni sull' irrigazione della pianura di Conia. Del Alberto Theodoli. *Sketch-map.*

Turkey—Asia Minor—Railways. *B. American G.S.* **41** (1909): 691–696. **Huntington.**
Railroads in Asia Minor. By Ellsworth Huntington. *Sketch-map.*

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Africa—British Colonies. **Johnston.**
Britain across the seas: Africa. A history and description of the British Empire in Africa. By Sir Harry Johnston. London: National Society, 1910. Size 9½ × 6, pp. xx. and 430. *Maps and Illustrations. Price* 10*s.* 6*d. net. Presented for the Author.*

Africa—French Colonies. **Hanotaux.**
Le partage de l'Afrique: Fachoda. Par Gabriel Hanotaux. Paris: E. Flammarion, [1909]. Size 7½ × 5, pp. xii. and 358. *Sketch-maps. Price* 3.50 *fr.*

Belgian Congo—Ethnology. **Butaye.**
Dictionnaire Kikongo-Français Français-Kikongo. Par R. Butaye, S.J. Roulers: J. de Meester, [1910]. Size 8 × 5½, pp. xiv., 308, 238, and 90. *Price* 15 *fr. Presented for the Author by Rev. I. Struyf.*

British East Africa—Kikuyu. **Routledge.**
With a prehistoric people: the Akikúyu of British East Africa. Being some account of the method of life and mode of thought found existent amongst a nation on its first contact with European civilization. By W. Scoresby Routledge and Katherine Routledge. London: E. Arnold, 1910. Size 9½ × 6½, pp. xxxii. and 392. *Map and Illustrations. Price* 21*s. net. Presented by the Publisher.*

French Equatorial Africa. *La G., B.S.G. Paris* **20** (1909): 273–280. **Dujour.**
De la moyen Sangha au bas Ogooué. Par [le capitaine F. G.] Dujour.

French Equatorial Africa—Ethnography. **Avelot.**
B.G. hist. et descriptive, 1908 (1909): 401–403.
Le pays d'origine des Pahouins et des Bakalais. Par le capt. R. Avelot.

French Equatorial Africa—Ethnology. **Lacroix.**
La G., B.S.G. Paris **20** (1909): 201–206.
Sur le travail de la pierre polie dans le haut Oubanghi. Par A. Lacroix. *Illustrations.*

French West Africa—Coast. *La G., B.S.G. Paris* **20** (1909): 9–24. **Chudeau.**
Notes géologiques sur la Mauritanie. Par R. Chudeau. *Sections.*

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Observations géographiques sur la Mauritanie occidentale. Par A. Gruvel. *Maps and Illustrations.*

See *Journal*, vol. **34**, p. 456.

German South-West Africa—Diamonds. **Gallus.**
Z. Kolonialpolitik **12** (1910): 944–960, 29–58.

Die Diamantvorkommen in Deutsch-Südwestafrika und ihre Bedeutung für das Schutzgebiet. Von Oberstleutnant z. D. Gallus. *Sketch-map.*

German South-West Africa—Diamonds. **Range.**
Deutches Kolonialblatt **20** (1909): 1039–1048.

Die Diamantfelder bei Lüderitzbucht. Von Dr. Paul Range. *Sketch-map and Illustrations.*

Referred to in the February number, p. 197.

Italian Colonies. **Mori.**
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I confini e l'area dell' Africa Italiana. Notizie storiche e determinazioni planimetriche di Attilio Mori. *Sketch-maps.*

Italian Somaliland—Boundary. *B.S.G. Italiana* **9** (1908): 672–685. **Blessich.**

Le frontiere tra l'Abissinia e la Somalia e Dancalia italiane. Di Aldo Blessich. *Sketch-maps.*

Ivory Coast. *La G., B.S.G. Paris* **20** (1909): 207–224. **Chevalier.**

Les massifs montagneux du nord-ouest de la Côte d'Ivoire. Par Aug. Chevalier.

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Le massif d'Ambre (Madagascar). Par A. Landais. *Sketch-maps and Illustrations.*

Nigeria, Southern—Ethnology. **Dayrell.**

Folk stories from Southern Nigeria, West Africa. By Elphinstone Dayrell. London: Longmans & Co., 1910. Size 8 × 5, pp. xvi. and 160. *Illustration. Price 4s. 6d. net. Presented by the Publishers.*

Nyasaland.

The Handbook of Nyasaland, comprising historical, statistical, and general information concerning the Nyasaland Protectorate. 2nd edit. (1910). London: Wyman & Sons (Zomba: Government Printer), 1910. Size 8½ × 5½, pp. xii. and 288. *Sketch-map and Illustrations. Price 3s. 6d. Presented by the Editor.*

Sudan. **Cornet.**

Capitaine [J.] Cornet. Au Tchad: trois ans chez les Senoussistes, les Ouaddaïens et les Kirdis. 2e edition. Paris: Plon, 1910. Size 7½ × 5, pp. 326. *Sketch-maps and Illustrations. Price 4 fr. Presented by the Publisher.*

NORTH AMERICA.

Canada—Arctic Islands. **Bernier.**

Report on the Dominion Government Expedition to Arctic Islands and the Hudson Strait on board the C.G.S. *Arctic*, 1906-1907. By Captain J. E. Bernier. Ottawa, 1909. Size 10 × 6½, pp. vi. and 128. *Map and Illustrations. Presented by the Minister of Marine and Fisheries, Ottawa.*

This is the subject of a special article (July, 1910, p. 63).

Mexico. **Terry.**

Terry's Mexico. Handbook for travellers, by T. Philip Terry. London: Gay & Hancock, 1910. Size 6 × 4, pp. ccxl. and 596. *Maps and Plans. Price 12s. Presented by the Editor.*

Besides detailed descriptions of routes after the model of Baedeker, there is a preliminary section of over 200 pp., giving general information on the country and its people, art and literature, history, etc.

North America—Climate and Agriculture. **Eckardt.**
Deutsche Rundschau G. 32 (1910): 145–156.

Ueber agrikulturgeographische Wirkungen des nordamerikanischen Klimas. Von Dr. phil. Wilh. R. Eckardt. *Sketch-map.*

North America—Ethnography. **Wissler.**
Verhandl. XVI. Amerikan. Kongress, 1908 (1910): 477–487.

Types of dwellings and their distribution in Central North America. By Clark Wissler.

North America—Geological History. *J. Geology* **17** (1909): *passim.* **Willis.**

Paleogeographic maps of North America. By Bailey Willis. *Sketch-maps.*

North America—Transport. *Ann. G.* **17** (1908): 433–456. **Baulig.**
Sur la distribution des moyens de transport et de circulation chez les indigènes de l'Amérique du Nord. Par H. Baulig. *Sketch-map.*

United States—Arizona. *Smithsonian Misc. Collections* **52** (1909): 403–436. **Fewkes.**
Prehistoric ruins of the Gila valley. By J. Walter Fewkes. *Plans and Illustrations.*

United States—Coal-fields. *Petermanns M.* **55** (1909): 320. ———
Die Kohlenfelder der Vereinigten Staaten. *Map.*

United States—East Coast. ———
East Coast of the United States Pilot. Part II. From Barnegat Inlet, New Jersey, to Cape Canaveral, Florida. Second edition. London, 1909. Size 9½ × 6, pp. xx. and 388. *Index Charts, and Illustrations. Presented by the Hydrographer, Admiralty.*

United States—Florida—Mangroves. **Vaughan.**
Smithsonian Misc. Collections **52** (1909): 461–464.
The geologic work of mangroves in Southern Florida. By T. Wayland Vaughan. *Illustrations.*
The part played by mangroves in building up new land is well illustrated by photographs.

United States—Railways. *J.G.* **8** (1910): 97–109. **Perkins.**
The Transcontinental lines of the West. By A. E. Perkins. *Sketch-map and Diagrams.*

United States—Sierra Nevada. *Sierra Club B.* **7** (1910): 141–148. **McAdie.**
The observatory on Mount Whitney. By Alexander McAdie. *Illustrations.*

CENTRAL AND SOUTH AMERICA.

Argentina. **Hirst.**
Argentina. By W. A. Hirst. (The South American Series; edited by Martin Hume.) London: T. Fisher Unwin, 1910. Size 9 × 6, pp. xxviii. and 308. *Map and Illustrations. Price* 10*s.* 6*d. net. Presented by the Publisher.*

Brazil. **Oakenfull.**
Brazil in 1910. By J. C. Oakenfull. Edited by the Commission of Economic Expansion of Brazil, Paris. Second edition. Plymouth, 1910. Size 7½ × 5, pp. vi. and 280. *Sketch-maps and Illustrations. Presented by the Author.*

Central America—Climate. *M.G. Ges. Hamburg* **24** (1909): 31–84. **Lottermoser.**
Die Ergebnisse der Temperatur-Beobachtungen in Salvador und Süd-Guatemala, zusammengestellt und erörtert von Eckhard Lottermoser. *Diagram.*

Chile—Atacama. *Scottish G. Mag.* **26** (1910): 1–9, 57–67. **Bowman.**
The Regional Population Groups of Atacama. By Isaiah Bowman. *Sketch-map.*

Chile—Monsoons. *T.R.S. Edinburgh* **47** (1908–9): 137–141. **Mossman.**
The Monsoons of the Chilian Littoral (Preliminary Note). By R. C. Mossman.

Ecuador—Galapagos Islands. *P. California A. Sc.*, Ser. IV. **1** (1907): 1–6. **Denburgh.**
Expedition of the California Academy of Sciences to the Galapagos Islands, 1905–1906. I. Preliminary descriptions of four new races of gigantic land tortoises from the Galapagos Islands. By J. Van Denburgh.

Falkland Islands. **Groussac.**
Paul Groussac. Les îles malouines: nouvel exposé d'un vieux litige. (Extrait des *Anales de la Biblioteca Nacional de Buenos Aires.*) Buenos Ayres, 1910. Size 10½ × 6½, pp. 188. *Map. Presented by the Author.*
An attempt to substantiate the rights of Argentina to the group.

Falklands—Phytogeography. **Skottsberg.**
Studien über das Pflanzenleben der Falklandinseln. Von Carl Skottsberg. (W. Ergebnisse Schwedischen Südpolar-Expedition 1901–03, Band 4, Lief. 10.) Stockholm, 1909. Size 10½ × 8½, pp. 58. *Illustrations.*

Panama Canal. *J.R. Artillery* **36** (1909–10): 529–549. **Paul.**
The Panama canal: its strategic and economic value. By Major E. M. Paul. *Sketch-maps, Illustrations, and Section.*

Peru—Meteorology **Hann.**

Zur Meteorologie von Peru. Von J. Hann. (Aus den Sitzungsberichten der kaiserl. Akademie der Wissenschaften in Wien. Mathem.-naturw. Klasse. Bd. cxviii., Abt. IIa., November 1909.) Vienna, 1909. Size 9½ × 6½, pp. 90. *Presented by the Author.*

South America.

'The Times:' South American number, Tuesday, December 28, 1909. Size 24 × 19, pp. 88. *Maps and Illustrations.*

A sketch of the economic condition of each of the South American States.

Tierra del Fuego—Phytogeography. **Skottsberg.**

Pflanzenphysiognomische Beobachtungen aus dem Feuerland. Von Carl Skottsberg. (W. Ergebnisse Schwedischen Südpolar-Exped., 1901-3; Band 4, Lief. 9.) Stockholm, 1909. Size 10½ × 8½, pp. 64. *Map and Illustrations.*

Venezuela. *J. Manchester G.S.* **25** (1909): 18-31. **Bolivar.**

Venezuela. By Miss Gabriela de Bolivar.

AUSTRALASIA AND PACIFIC ISLANDS.

New Guinea—British—Ethnology. **Seligmann.**

The Melanesians of British New Guinea. By Dr. C. G. Seligmann, with a chapter by F. R. Barton and an appendix by E. L. Giblin. Cambridge: University Press, 1910. Size 9½ × 6, pp. xxiv. and 766. *Map and Illustrations. Price 21s. net. Presented by the Author.*

Samoa. *Abh. K.A.W. München* **24** (1909): 290-310. **Weber.**

Zur Petrographie der Samoa-Inseln. Von M. Weber.

South Australia—Coral. **Howchin.**

T. and P.R.S. South Australia **33** (1909): 242-252.

Note on the Discovery of a Large Mass of Living Coral in Gulf St. Vincent, with Bibliographical References to the Recent Corals of South Australia. By Walter Howchin. *Illustrations.*

South Australia—Geology. **Howchin.**

T. and P.R.S. South Australia **33** (1909): 253-261.

Description of an Old Lake Area in Pekina Creek, and its Relation to Recent Geological Changes. By Walter Howchin. *Illustrations.*

POLAR REGIONS.

Antarctic—German Expedition. **Drygalski.**

Deutsche Südpolar-Expedition 1901-1903 . . . herausgegeben von Erich von Drygalski. Vol. 11. (Zoologie, III. Band.) Berlin: G. Reimer, [1909-]1910. Size 13½ × 10, pp. viii. and 596. *Maps and Illustrations. Presented by the Imperial Foreign Office, Berlin.*

Antarctic—Ice-forms. **Philippi.**

Geol. Charakterbilder (Stille), Heft **1** (1910): Plates 1-6.

Eisberge und Inlandeis in der Antarktis. Von E. Philippi. *Illustrations. Price* 3 *m.* 60.

The first issue of a valuable publication, intended to supply well-chosen illustrations of typical geological and geographical features. The parts will appear at irregular intervals, according to the material available.

Antarctic—Shackleton Expedition. **Murray and others.**

British Antarctic Expedition, 1907-9, under the command of Sir E. H. Shackleton. Reports on the scientific investigations. Vol. 1. Biology, edited by James Murray. Parts 1-4. London: W. Heinemann, 1910. Size 12 × 10, p. 80. *Sketch-map and Illustrations. Price 12s. 6d. net. Presented by Sir E. H. Shackleton.*

Arctic—Exploration. **Bryce.**

The siege and conquest of the North Pole. By George Bryce. London: Gibbings & Co., 1910. Size 9 × 5½, pp. xvi. and 334. *Sketch-maps. Price 7s. 6d. Presented by the Publishers.*

Greenland—Danish Expedition. **Friis.**

Im Grönlandeis mit Mylius-Erichsen: die Danmark-Expedition 1906–1908. Von Achton Friis. Leipzig: O. Spamer, 1910. Size 9½ × 6½, pp. xviii. and 630. *Map and Illustrations. Price* 15*s.*

Greenland—Eskimos. **Trebitsch.**

Bei den Eskimos in Westgrönland. Ergebnisse einer Sommerreise im Jahre 1906 von Dr. Rudolf Trebitsch, nebst einem ethnologischen Anhang von Dr. Michael Haberlandt. Berlin: D. Reimer, 1910. Size 9½ × 6½, pp. xxiv. and 162. *Map and Illustrations. Price* 8*m. Presented by the Publisher.*

MATHEMATICAL GEOGRAPHY.

Cartography. **Reeves.**

Maps and map-making: three lectures delivered under the auspices of the Royal Geographical Society. By E. A. Reeves. London: The Royal Geographical Society, 1910. Size 8½ × 5½, pp. xiv. and 146. *Maps, Illustrations, and Diagrams. Price (to Fellows)* 6*s. net; (to non-Fellows)* 8*s. net.*

The lectures are printed as delivered, with a few amplifications. They form the most convenient summary in existence of the history and methods of map-making.

Cartography—Projection. **[Close.]**

Tables for the projection of graticules for maps on the scale of 1: 1,000,000. Prepared by the Geographical Section of the General Staff, War Office. (To be used as Appendix XII., Text-book of Topographical Surveying.) London: Harrison & Sons, 1910. Size 10½ × 7½, pp. 6. *Price* 2*d.*

Geodesy. *C.R.A. Sc. Paris* **150** (1910): 265–267. **Lallemand.**

Sur une erreur systématique de la détermination du niveau moyen de la mer à l'aide du médimarémètre. Par Ch. Lallemand.

Hydrography—Surveying. **Messum.**

Hydrographic surveying: elementary. For beginners: seamen and others. By Commander Stuart N. S. C. Messum. London: C. Griffin & Co., 1910. Size 8 × 5, pp. xiv. and 504. *Charts and Diagrams. Price* 12*s. net. Presented by the Publishers.*

Navigation. **U.S. Navy Dept.**

Department of the Navy: Bureau of Equipment. Reprints of Hydrographic Information, No. 10. The use and interpretation of charts and sailing directions (pp. 20). No. 11: Production of Navigational charts (pp. 12). Washington, 1910. Size 9 × 6.

Star Charts. **Clancey.**

Star Charts and how to use them. Chiefly for Latitude 20° North . . . By J. C. Clancey. Burma, 1908. Size 12 × 9½, pp. 44. *Charts. Presented by the Author.*

PHYSICAL AND BIOLOGICAL GEOGRAPHY.

Geological History. *G.Z.* **15** (1909): 674–684. **Arldt.**

Paläogeographie und Seismologie. Von Th. Arldt.

Geological History. *J. Geology* **17** (1909): 589–599. **Salisbury.**

Physical Geography of the Pleistocene, with special reference to Pleistocene conditions. By Rollin W. Salisbury.

Geomorphology. **Schwarz.**

Causal geology. By E. H. L. Schwarz. London: Blackie & Son, 1910. Size 9 × 6, pp. viii. and 248. *Sketch-maps, Sections, and Illustrations. Price* 7*s.* 6*d. net. Presented by the Publishers.*

Geomorphology—Rivers. *C.R.A. Sc. Paris* **150** (1910): 567–568. **Brunhes.**

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Geophysics. *C.R.A. Sc. Paris* **149** (1909): 388-392, 474-477. **Lallemand.**
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Sur les marées théoriques du géoïde, dans l'hypothèse d'une absolue rigidité de la terre. By the same.

Geophysics. *C.R. IX^e Congrès Internat. G. Genève*, 1908 (1909) **1**: 401-427. **Lallemand.**
La respiration de la terre: l'écorce terrestre et ses lentes déformations. Par Ch. Lallemand. *Maps and Diagrams.*

Geophysics. *P.R.S., Ser. A.* **82** (1909): 89-96. **Larmor.**
The relation of the Earth's free precessional nutation to its resistance against tidal deformation. By Prof. J. Larmor.

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Glacial Erosion. **Brunhes.**
C.R. IX^e. Congrès Internat. G. Genève, 1908 (1909) **1**: 338-342.
Le processus du creusement glaciaire. Par le prof. Jean Brunhes. (*Résumé.*)

Glacial Erosion. *B. American G.S.* **41** (1909): 665-683. **Johnson.**
Hanging Valleys. By Douglas Wilson Johnson. *Illustrations and Diagrams.*

Glacial Erosion. *C.R.A. Sc. Paris* **150** (1910): 135-138. **Martonne.**
Sur la théorie mécanique de l'érosion glaciaire. Par E. de Martonne.

Magnetism. **Bauer.**
Department of Terrestrial Magnetism of the Carnegie Institution of Washington. Annual Report of the Director, 1909. (Reprinted from Year Book, No. 8.) Washington, 1909. Size 10 × 7, pp. 194-202. *Illustrations.*
The illustrations show the *Carnegie* and its deck.

Magnetism. *Terrestrial Magnetism* **14** (1909): 161-176. **Bauer.**
Some of the Problems of Ocean Magnetic Work. By L. A. Bauer. *Illustrations.*

Meteorology. *Met. Z.* **27** (1910): 49-61. **Merecki.**
Uber den Einfluss der veränderlichen Sonnentätigkeit auf den Verlauf der meteorologischen Elemente auf der Erde. Von R. Merecki.

Meteorology—Precipitation. *M.k.k.G. Ges. Wien* **52** (1909): 469-483. **Rühl.**
Die Niederschlagstypen und ihre geographischen Beziehungen. Von Dr. Alfred Rühl.

Meteorology—Storms. *Ann. Hydrographie* **37** (1909): 529-553. **Pollitz.**
Die Stürme im südlichen Indischen Ozean, eine Untersuchung ihrer Häufigkeit, Anfangsrichtung, Dauer, Winddrehung und Luftdruckverhältnisse. Von Theodor Pollitz. *Maps and Diagrams.*

Meteorology—Temperature. *Monthly Weather Rev.* **37** (1909): 191-193. **Clayton.**
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Pilotenkarten, meteorologische Karten, und Monatskarten der Ozeans. Ein Beitrag zur maritimen Kartographie. Von Prof. Dr. Gerhard Schott.

Oceanic Deposits. **Philippi.**
Deutsche Südpolar-Expedition, 1901-03. Herausgegeben von Erich von Drygalski. II. Band, Geographie und Geologie. Heft VI. E. Philippi: Die Grundproben den Deutschen Südpolar-Expedition, 1901-03. Berlin: G. Reimer, 1910. Size 13½ × 10, pp. 411-616. *Maps.*

Oceanography. **Schott.**
Physiche Meereskunde. Von Prof. Dr. Gerhard Schott. Zweite Auflage. (Sammlung Göschen.) Leipzig: G. J. Göschen, 1910. Size 6 × 4, pp. 144. *Sketch-maps, Illustrations, and Diagrams. Price 80 pfg. Presented by the Publisher.*
An excellent *résumé* of the main facts and principles of Oceanography.

Oceanography—Currents. **Querfurt.**
Ann. Hydrographie **37** (1909): 107–121, 153–172, 208–223.
Die Einwirkung der Winde auf die Strömungen im Skagerrak und Kattegat mit besonderer Berücksichtigung der am Leuchtschiff "Skagens Riff" angestellten Beobachtungen während der Jahre 1903 bis 1905. Von Heinrich Querfurt. *Sketch-chart and Diagrams.*

Oceanography—Currents. **Sandström and Helland-Hansen.**
Rep. Norwegian Fishery Investigations **2** (1909): No. 4, pp. 44.
Ueber Berechnung von Meeresströmungen. Von J. W. Sandström und B. Helland-Hansen. *Diagrams.*

Oceanography—Currents. *Ann. Hydrographie* **37** (1909): 193–203. **Witting.**
Zur Kenntnis des vom Winde erzeugten Oberflächenstromes. Von Rolf Witting. *Sketch-maps and Diagram.*

Oceanography—Depths. *Ann. Hydrographie* **37** (1909): 558–563. **Simonsen.**
Lotungen an der Küste von Brasilien zwischen Kap Blanco und Kap Frio und bei der Insel Fernando Noronha, 1902 bis 1908. Von Kapt. A. Simonsen. *Chart.*
The chart shows the newly determined depths side by side with those given in the British Admiralty chart.

Oceanography—Indian Ocean. **K. Ned. Meteorologisch Instituut.**
Koninklijk Nederlandsch Meteorologisch Instituut. No. 105. Oceanographische en meteorologische waarnemingen bij Kaap Guardafui. [Amsterdam, 1910.] Size 14½ × 23, 36 ll. *Maps.*
Intended to replace two previous publications, issued in 1888 and 1889.

Oceanography—Mediterranean. *La G., B.S.G. Paris* **21** (1910): 99–112. **Schmidt.**
Exposé sommaire des travaux de l'expédition océanographique danoise dans la Méditerranée (1908–1909). Par Johs. Schmidt. *Sketch-map, Illustration, and Sections.*

Oceanography—North Atlantic. **Paulsen.**
Meddelelser Komm. Havundersøgelser, Plankton **1** (1909): No. 8, pp. 58.
Plankton investigations in the waters round Iceland and in the North Atlantic in 1904. By Ove Paulsen. *Sketch-maps and Illustrations.*

Oceanography—North Atlantic. **Deutsche Seewarte.**
Kaiserliche Marine. Deutsche Seewarte. Segelhandbuch für den Atlantischen Ozean. Dritte Auflage. Herausgegeben von der Deutsche Seewarte. Hamburg: L. Friederichsen & Co., 1910. Size 10½ × 7½, pp. xiv. and 562. *Maps and Diagrams. Price* 20*m. Presented by the Publishers.*

Oceanography—North Sea. **Gran.**
Rep. Norwegian Fishery Investigations **2** (1909): No. 5, pp. 222.
Das Plankton des norwegischen Nordmeeres von biologischen und hydrographischen Gesichtspunkten behandelt. Von H. H. Gran. *Sketch-maps and Illustrations.*

Oceanography—Red Clay. *P.R.S. Edinburgh* **30** (1910): 183–201. **Caspari.**
The Composition and Character of Oceanic Red Clay. By Dr. W. A. Caspari.
See note, *ante*, p. 226.

Phytogeography. *K. Danske Vidensk. S. Skrifter* **8** (1909): 1–70. **Raunkiær.**
Livsformen hos planter paa ny jord. Af C. Raunkiær. *Illustrations.*

Seismology. *P.R.S. Edinburgh* **30** (1909–10): 23–37. **Knott.**
Seismic radiations. By Prof. C. G. Knott. Part ii.

Tides. *P.R.S., Ser. A.* **82** (1909): 448–464. **Rayleigh.**
Notes concerning tidal oscillations upon a rotating globe. By Lord Rayleigh.

Tides. **Tizard.**
Local and Greenwich time of high water on full and change days, with the rise of the tide at springs and neaps, for the principal ports of the world, 1910. Compiled . . . by Captain T. H. Tizard. London: Hydrographic Office, Admiralty, 1910. Size 9½ × 6, pp. 172. *Presented by the Hydrographer, Admiralty.*

ANTHROPOGEOGRAPHY AND HISTORICAL GEOGRAPHY.

Anthropogeography. **Kirchhoff.**

Mensch und Erde: Skizzen von den Wechselbeziehungen zwischen beiden. Von Alfred Kirchhoff. 3. Auflage. (Aus Natur und Geisteswelt: Sammlung wissenschaftlich-gemeinverständlicher Darstellungen, 31. Bändchen.) Leipzig: B. G. Teubner, 1910. Size 7½ × 5, pp. vi. and 100. *Price* 1.25*m*. *Presented by the Publisher.*

These valuable and suggestive essays (of which an English edition was brought out a few years ago by Messrs. Routledge) are now reprinted without alteration, but with the addition of illustrative notes by Dr. K. Müller-Gera.

Anthropogeography. **Lyde.**

Man in many lands: being an introduction to the study of geographic control. By L. W. Lyde. London: A. & C. Black, 1910. Size 7½ × 5, pp. viii. and 184. *Illustrations. Price* 2*s*. 6*d*. *Presented by the Publishers.*

Anthropology—Speech. **Geissler.**

Rhetorik: Richtlinien für die Kunst des Sprechens. Von Dr. Ewald Geissler. (Aus Natur und Geisteswelt: Sammlung wissenschaftlich-gemeinverständlicher Darstellungen, 310. Bändchen.) Leipzig: B. G. Teubner, 1910. Size 7 × 4½, pp. 140. *Price* 1.25*m*. *Presented by the Publisher.*

Deals with the subject almost entirely from a physiological and technical point of view.

Commercial Geography. **Gregory, Keller, and Bishop.**

Physical and commercial geography: a study of certain controlling conditions of commerce. By H. E. Gregory, A. L. Keller, and A. L. Bishop. Boston and London: Ginn & Co., 1910. Size 9½ × 6, pp. viii. and 470. *Maps and Diagrams. Price* 12*s*. 6*d*. *Presented by the Publishers.*

Historical—Fou-san. *Verhandl. XVI. Amerikan. Kongress*, 1908 (1910): 35–50. **Sakaki.**

Une nouvelle interpretation du pays de Fou-sang. Par le Prof. Ryozaburo Sakaki.

Historical—Odyssey. **Schwerin.**

Odysseus' Irrfärder: Geografisk undersökning af H. H. von Schwerin. (Lunds Universitets Årsskrift, N.F., Afd. 1, Bd. 6, Nr. 3.) Lund, 1909. Size 10 × 7, pp. 152. [*Résumé* in German.]

An attempt to show that a geographical reality lay behind the wanderings of Odysseus.

Historical—Trade. **Denucé.**

Privilèges commerciaux accordés par les rois de Portugal aux Flamands et aux Allemands (XV^e^ et XVI^e^ siècles). Par J. Denucé. (Extrait du Archivo Historico Portuguez, vol. 7.) Lisbon, 1809. Size 11½ × 8, pp. 30.

History of Cartography. *Riv. G. Italiana* **16** (1909): 364–367. **Mori.**

Documenti cartografici inediti conservati nella Biblioteca Comunate di Poppi. Di Attilio Mori.

Military Geography. *Petermanns M.* **56** (1910): 53–55. **Porro.**

Aufgaben und Methoden der Militärgeographie. Von Generalmajor Carlo Porro.

GENERAL.

Education—Text-book. **Kirk and Taylor.**

The Oxford Geographies, edited by A. J. Herbertson. Senior Geography: Questions, by F. M. Kirk; Statistical appendix, by E. G. R. Taylor. Oxford: Clarendon Press, 1910. Size 7½ × 5, pp. 64. *Price* 1*s*. *Presented by the Publishers.*

The questions occupy the first 12 pp. only. The statistics given in the remainder seem to have been compiled with great care.

Languages—Manual. **Marlborough.**

Marlborough's Traveller's practical manual of conversation in four languages: English, French, German, and Italian. Second edition. London: E. Marlborough & Co., 1909. Size 6½ × 3½, pp. 144. *Price* 1*s*. 6*d*. *Presented by the Publishers.*

Mediterranean Lands. **Millard.**

The Mediterranean cruise, describing all Mediterranean points usually visited in a winter's cruise in Europe, Asia, and Africa. Compiled by Bruce Millard. London,

etc.: G. P. Putnam's Sons, 1910. Size 7½ × 5, pp. xii. and 438. *Illustrations. Price 9s. net. Presented by the Publishers.*

Sciences. **Huggins.**

The Royal Society: or, Science in the State and in the Schools. By Sir William Huggins. London: Methuen & Co., 1906. Size 10 × 7, pp. xvi. and 132. *Illustrations. Presented by the Author.*

A reprint of four addresses dealing with the general relations of Science, as represented by the Royal Society, to the national life.

World. **Peary.**

International geographical history of the world, accompanying the "International Flat Globe." Edited by Robert E. Peary. New York: International Globe Co., [1909]. Size 10 × 7½, pp. 96. *Maps and Illustrations. Presented by the Publishers.*

Year-book. **Wagner.**

Geographisches Jahrbuch. 32. Band, 1909 . . . herausgegeben von Hermann Wagner. Gotha: J. Perthes, 1909. Size 9 × 6, pp. viii. and 474. *Maps. Price 15M.*

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Large-sheet series, printed in colours, and folded in covers or flat in sheets, 71, 119. *Price, on paper, 1s. 6d.; mounted on linen, 2s.; mounted in sections, 2s. 6d. each.*

6-inch—County Maps:—

Cheshire, 2 sheets. **Hampshire**, 10 sheets. **Kent**, 3 sheets. **Lancashire**, 5 sheets. **Lincolnshire**, 2 sheets. **Sussex**, 4 sheets. **Yorkshire**, 42 sheets. *Price 1s. each.*

Scale 1 : 2500. County Maps.

Cheshire, 27 sheets. **Hampshire**, 52 sheets. **Lancashire**, 5 sheets. **Sussex**, 19 sheets. **Yorkshire**, 50 sheets. *Price 3s. each.*

(*E. Stanford, London Agent.*)

Dalmatia. **Schubert.**

Verbreitung der Susswasserneogen- und Diluvialschotter-Vorkommen im Bericht der Zermanja, Kerka und Cetina. [Von Dr. R. Schubert.] Scale 1 : 750,000 or 1 inch to 11·8 stat. miles. *Petermanns Mitteilungen*, Jahrgang 1910, II., Tafel 6. Gotha: Justus Perthes, 1910. *Presented by the Publishers.*

France. **Ministre de l'Intérieur.**

Carte de la France dressée par ordre du Ministre de l'Intérieur. Scale 1 : 100,000 or 1 inch to 1·6 stat. mile. Sheets (new editions): iii.–16, Douarnenez; vii.–17, Ploërmel; xi.–25, St. Jean d'Angély; xiv.–24, Bellac; xvi.–33, Albi; xix.–30, Mende; xxii.–21, Chalon-sur-Saône; xxii.–22. Louhans; xxxiv.–18, Vesoul; xxiv.–22, Morez. New editions. Paris: Hachette & Cie., 1910. *Price 0.80 fr. each sheet.*

Germany. **K. Bayer. General Stabes.**

Karte des Deutschen Reiches. Herausgegeben vom topogr. Bureau des K. Bayer. General-Stabes. Scale 1 : 100,000 or 1 inch to 1·6 stat. mile. Sheets: (Kupferdruckausgabe) 557, Neustadt a. d. Haardt; 636, Mindelheim; 638, München. *Price, 1.50m. each sheet.* (Umdruckausgabe) 638, München. *Price 1m. each sheet.* Berlin: R. Eisenschmidt, 1909.

ASIA.

Asia Minor. **Kiepert.**

Karte von Kleinasien bearbeitet von Dr. Richard Kiepert. Scale 1 : 400,000 or 1 inch to 6·3 stat. miles. Sheet D IV. (Zweite Auflage), Adana. Berlin: Dietrich Reimer (Ernst Vohsen), 1910.

This sheet includes Adana, Tarsus, the Cilician Gates, and the north coast of Syria, including the valley of the Orontes. A comparison with the earlier edition will show that it is practically a reprint. In many parts of Asia Minor a considerable amount of fresh topographical information has been obtained since the last edition of this valuable map was published, all of which will doubtless be carefully considered and embodied in this new edition. Apart from the railway surveys and the coast-line, the mapping depends to a great extent upon more or less contradictory route traverses, and in many parts even these are wanting.

Caucasus. **Dirr.**

Die Verbreitung der Hausgewerbe (Kustari) im Daghestan. Nach offiziellen Daten von Dr. A. Dirr. Scale 1 : 700,000 or 1 inch to 11·05 stat. miles. *Petermanns Mitteilungen*, Jahrgang 1910, I., Tafel 50. Gotha: Justus Perthes, 1910. *Presented by the Publishers.*

Indian Government Surveys. **Surveyor-General of India.**

India and adjacent countries, scale 1 inch to 1 mile: North-West Frontier Province, 9 sheets; Punjab and Baluchistan, 2 sheets; Punjab, 2 sheets; Madras, 2 sheets; Central India, 3 sheets; United Provinces, 1 sheet; Bengal, 6 sheets; Eastern Bengal and Assam, 4 sheets; Burma, 7 sheets. Railway and Canal map of India, scale 1 inch to 32 miles, 6 sheets. North-west Frontier Series, scale 1 inch to 2 miles, 1 sheet. Bengal Survey, scale 1 inch to 1 mile, 2 sheets. Bombay Survey, scale 1 inch to 1 mile, 4 sheets. Central Provinces Survey, scale 1 inch to 1 mile, 2 sheets. United Provinces Survey, 1 inch to 1 mile, 5 sheets. Mainpuri District, United Provinces, scale 1 inch to 4 miles. Punjab Survey, scale 1 inch to 1 mile, 1 sheet. Calcutta: Surveyor-General's Office, 1910. *Presented by the Secretary of State for India, through the India Office.*

Malay Archipelago. **Elbert.**

Dr. J. Elbert: Reisewege der Frankfurter Sunda-Expedition, 1909–1910. Scales 1 : 2,000,000 or 1 inch to 31·6 stat. miles, and 1 : 1,000,000 or 1 inch to 15·8 stat. miles. *Petermanns Mitteilungen*, Jahrgang 1910, I., Tafel 52. Gotha: Justus Perthes, 1910. *Presented by the Publishers.*

Siberia. **[Imp. Russian Hydrographic Dept.]**

Tiefenkarte des Baikal-Sees nach den Arbeiten der hydrographischen Expedition nach dem Baikal-See 1896–1902 und früheren Arbeiten. Nach dem russischen Original in 1 : 1,210,000 reduziert auf 1 : 1,500,000 (1 inch to 23·6 stat. miles). *Petermanns Mitteilungen*, Jahrgang 1910, Tafel 51. Gotha: Justus Perthes, 1910. *Presented by the Publishers.*

This chart, based upon the Russian hydrographic surveys of 1896–1902 combined with earlier work, shows the depths of the lake by shades of blue increasing in density with the depths. The contours, in English feet, limiting these tints are 0–100, 100–300, 300–500, 500–700, 700–750, below 750. Three vertical sections across the lake are given as insets.

Tibet. **Habenicht.**

Das Hochland von Tibet zur Uebersicht von Sven Hedins Reisen 1894–1908. Entwurf und Terrain von H. Habenicht. Situation und Schrift von C. Barich. Scale 1 : 3,700,000 or 1 inch to 58·4 stat. miles. *Petermanns Mitteilungen*, Jahrgang 1910, II., Tafel 2. Gotha: Justus Perthes, 1910. *Presented by Herr H. Habenicht.*

A general map of Tibet prepared specially to show the results of the explorations and routes of Dr. Sven Hedin, which are clearly indicated in red, the journeys of 1894–1902 being distinguished from those of 1906–1908 by a different symbol being used. A comparison of this map with that published by the Society in 1906 will show at a glance the extent of Dr. Hedin's explorations, which have done much to fill in the blank places on the map. It is interesting to see that the name of Ryder has been given to the long range of mountains extending from west to east across the country immediately to the north of the Brahmaputra, while "Transhimalaya" appears in brackets just above it. It will be remembered that considerable discussion took place when Dr. Sven Hedin was in London as to the naming of this range. Immediately to the north of the western section of this range, the mountains are called after the

explorer, and the name "Hedin Gebirge" extends from above 80° 30′ to 84° 30′ E. long.

This map and Dr. Sven Hedin's short account of the scientific results of his last expedition appear in *Petermanns Mitteilungen* for last month.

AFRICA.

Africa. **Geographical Section, General Staff.**

Map of Africa. Scale 1 : 250,000 or 1 inch to 3·9 stat. miles. Sheet 129–J, Maseru, Basutoland. *Price* 1*s.* 6*d. net.* Scale 1 : 125,000 or 1 inch to 1·97 stat. mile. Sheet $\frac{\text{South A 37}}{\text{G 11}}$, Nairobi, East Africa Pretectorate. *Price* 2*s. net.* Scale 1 : 62,500 or 1 inch to 0·986 stat. mile. Sheet: Nairobi and surrounding country. *Price* 1*s.* 6*d. net.* London: Geographical Section, General Staff, War Office, and Edward Stanford, 1910. *Presented by the Director of Military Operations.*

Egypt. **Survey Department, Giza.**

Topographical map of Egypt. Scale 1 : 50,000 or 1·3 inch to 1 stat. mile. Sheets: N.W. IV.–II., Kom Hamada; IV.–III., Nubaria canal; V.–II., Itai el Barud; V.–III., Hosh Isa; VI.–II., Desuq; VI.–III. Damanhur; VI.–IV., Kafr el Dawar; VI.–V., Alexandria; VII.–III., Edku; VII.–IV., Abu Qir; VII.–V., Ramleh. Giza: Survey Department, 1910. *Presented by the Director-General, Survey Department, Giza.*

Egypt. **Survey Department, Giza.**

Topographical map of Egypt. Scale 1 : 10,000 or 6·3 inches to 1 stat. mile. Sheets: Mudiria Sharqia, 10–11, 11–10 N.E.; Mudiria Menufia, 14–2, 3, N.E., 15–2, 3, 16–2, 3, 17–3, N.W. Giza: Survey Department, 1910. *Presented by the Director-General, Egyptian Survey Department.*

Togo. **Langhans.**

Die Togoküste 1885 und 1910. Von Paul Langhans. Scale 1 : 250,000 or 1 inch to 3·9 stat. miles. *Petermanns Mitteilungen*, Jahrgang 1910, I., Tafeln 47 u. 58. Gotha: Justus Perthes, 1910. *Presented by the Publisher.*

Transvaal. **Transvaal Mines Department.**

Geological Survey of the Transvaal. Scale 1 : 150,000 or 1 inch to 2·36 stat. miles. Sheets: 5, Zeerust; 6, Mafeking. With explanation. Pretoria: Transvaal Mines Department, Geological Survey, 1910. *Presented by the Director, Transvaal Geological Survey.*

AMERICA.

Chile. **Oficina de Mensura de Tierras.**

Republica de Chile. Scale 1 : 500,000 or 1 inch to 7·8 stat. miles. Sheets: Iquique; Tocopilla; Valdivia. Santiago: Oficina de Mensura de Tierras, 1909–1910. *Presented by the Director, Oficina de Mensura de Tierras, Santiago.*

Three sheets of the new Government map of Chile now in course of publication, and compiled from the most important surveys, including those of the recent boundary commission. Each sheet includes two degrees of latitude, and the limits of the present sheets are 19°–21°, 21°–23°, 39°–41°. Statistical diagrams, showing graphically areas of departments and density of population, together with tables of distances and altitudes along the railways, are given on the right of the sheets, while on the back of each is an index to place-names.

Panama. **Regel.**

Stand der nordamerikanischen Arbeiten am Panama-Kanal Mitte 1909. Nach den amtlichen Veröffentlichungen der Isthmian Canal Commission. [Von Prof. Dr. Fr. Regel.] Scale 1 : 150,000 or 1 inch to 2·3 stat. miles. *Petermanns Mitteilungen*, Jahrgang 1910, II., Tafel 7. Gotha: Justus Perthes, 1910. *Presented by the Publisher.*

To accompany Prof. Fr. Regel's note on the work of the Panama canal from July 1, 1908, to June 30, 1909, based upon the annual report of the Isthmian Canal Commission.

Peru. **Payer.**

Der Mittel- und Unterlauf des Ucayali mit seinem Zuflüssen. [Von Dr. Richard Payer.] Scale 1 : 1,500,000 or 1 inch to 23·6 stat miles. *Petermanns Mitteilungen*, Jahrgang 1910, II., Tafel 8. Gotha: Justus Perthes, 1910. *Presented by the Publisher.*

Two maps on the same scale, showing the course of Ucayali between 9° 20′ S. lat. and its junction with the Amazon, one according to the surveys of Richard Payer in 1886, and the other according to Raimondi's map of Peru and that of Pedro Portillo of 1907.

ARCTIC REGIONS.

Greenland. **Engell.**

Torsukatak und Ikarasak mit Benutzung von älteren Karten aufgenommen 1902–1904 von Dr. M. C. Engell. Scale 1 : 225,000 or 1 inch to 3·5 stat. miles. Jakobshavner Eisfjord und Tasiussak mit Benutzung von älterer Karten aufgenommen 1892–1904 von Dr. M. C. Engell. Scale 1 : 150,000 or 1 inch to 2·4 stat. miles. *Petermanns Mitteilungen*, Jahrgang 1910, Tafeln 54 u. 55. Gotha : Justus Perthes, 1910. *Presented by the Publisher.*

GENERAL.

World. **Bartholomew.**

The Graphic Atlas of the World. Edited by J. G. Bartholomew, LL.D., F.R.S.E., F.R.G.S. London : John Walker & Co., Ltd., 1910. *Price 5s. net. Presented by the Publishers.*

A handy-sized atlas for general reference, containing one hundred and twenty plates of maps, with numerous insets, plans, and a good index to place-names. The maps are clearly printed, not too highly coloured, and the names are easily legible. It is certainly surprising, after all that has passed, to see on map No. 6 Cook's name at the North Pole. Peary's name is also given, but with a later date.

World. **World Missionary Conference.**

Statistical Atlas of Christian Missions, containing a Directory of Missionary Societies, a Classified Summary of Statistics, an Index of Mission Stations, and a series of specially prepared maps of Mission Fields. Compiled by Sub-Committees of Commission I. . . . as an integral part of its Report to the World Missionary Conference, Edinburgh, June 14–23, 1910. Edinburgh : World Missionary Conference, 1910. *Presented by John R. Mott, Esq.*

In connection with Commission I. of the World Missionary Conference, lately held in Edinburgh, sub-committees were appointed, charged with the duty of compiling a Statistical Atlas representing the present status of missionary activities, and this atlas embodies the results of their labours. The data has nearly all been gathered from the official staff of the missionary societies, or from their published reports, and the statistics, as far as possible, according to the rule agreed upon, are based upon the returns of the year 1907, as published in the reports of 1908, though occasionally later information has been made use of.

The atlas consists of a hundred folio pages of statistical matter and tables, followed by twenty double-paged plates of well-executed maps, prepared and printed at Messrs. Bartholomew's establishment in Edinburgh, and an alphabetical list of missionary societies of the world. The financial responsibility for the publication of this volume has been assumed by the Student Volunteer Movement for Foreign Missions.

CHARTS.

Admiralty Charts. **Hydrographic Department, Admiralty.**

Charts and Plans published by the Hydrographic Department, Admiralty, during May, 1910. *Presented by the Hydrographer, Admiralty.*

New Charts—No. X, 11, Explanation of signs and abbreviations on Admiralty charts, 2*s*. 2779, River St. Lawrence above Quebec : Lotbinière to Batiscan, 4*s*. 2780, River St. Lawrence above Quebec : Batiscan to Bécancour, 3*s*. 2781, River St. Lawrence above Quebec : Bécancour to Lake St. Peter, 3*s*. **New Editions**—No. 1188, The World : Coal and telegraph chart, 4*s*. 391, England, south coast : Spithead, 3*s*. 2631, England, south coast : Portsmouth harbour, 5*s*. 109, England, east coast : Entrance to the river Humber, Grimsby road, 3*s*. 2180*b*, Scotland, north coast : Orkney islands, southern portion, 3*s*. 1290, South America, east coast : Nuevo gulf and adjacent coast, 2*s*. 575, Bay of Bengal : Madras to Ramiapatam, 3*s*. 2734, China, south coast : Si Kiang or West river, Sheet II., 3*s*. 1988, China, east coast : Approach to Sam sa inlet, 3*s*. 452, Japan : Yezo island with the adjacent straits of Tsugaru, La Perouse, and Yezo, 3*s*.

Atlantic, North. **U.S. Hydrographic Office.**

Pilot chart of the North Atlantic Ocean, July, 1910. Washington : U.S. Hydrographic Office, 1910. *Presented by the U.S. Hydrographic Office.*

Atlantic, North. **U.S. Weather Bureau.**

Meteorological chart of the North Atlantic Ocean, August, 1910. Washington: Department of Agriculture, U.S. Weather Bureau, 1910. *Presented by the U.S. Weather Bureau.*

Atlantic, North, and Mediterranean. **Meteorological Office.**

Monthly meteorological charts of the North Atlantic and Mediterranean, July, 1910. London: Meteorological Office, 1910. *Price 6d. each. Presented by the Meteorological Office.*

Indian Ocean. **Meteorological Office.**

Monthly meteorological charts of the Indian Ocean, July, 1910. London: Meteorological Office, 1910. *Price 6d. each. Presented by the Meteorological Office.*

Indian Ocean. **U.S. Hydrographic Office.**

Pilot chart of the Indian Ocean, July and August, 1910. Washington: U.S. Hydrographic Office, 1910. *Presented by the U.S. Hydrographic Office.*

Pacific, North. **U.S. Hydrographic Office.**

Pilot chart of the North Pacific Ocean, August, 1910. Washington: U.S. Hydrographic Office, 1910. *Presented by the U.S. Hydrographic Office.*

Pacific, North. **U.S. Weather Bureau.**

Meteorological chart of the North Pacific Ocean, August, 1910. Washington: Department of Agriculture, U.S. Weather Bureau, 1910. *Presented by the U.S. Weather Bureau.*

PHOTOGRAPHS.

Karakoram Himalayas. **Longstaff, Neve, and Oliver.**

Forty-eight photographs of the Eastern Karakoram, taken by Dr. T. G. Longstaff, Dr. Arthur Neve, and Captain D. G. Oliver. *Presented by T. G. Longstaff, Esq., M.A., M.D.*

A really excellent set of enlargements taken during Dr. Longstaff's last expedition to the Himalayas, of which an account was given in the *Geographical Journal* for June last. The panorama from the upper Siachen glacier is specially interesting, as are also several photographs showing the advance of glaciers, such as the Aktash glacier passing over an old pony-track, and the glacier advancing towards the pony-track on the west side of Sasir pass.

(1) View up lower part of Saltoro river; (2) Camp at Goma village; (3) Ghyari, shepherds camping-place below Bilafond glacier; (4) Terminal wall of secondary glacier entering Ghyari nala; (5) Secondary lateral glacier entering bed of Ghyari glen; (6) Left bank of Bilafond glacier near snout; (7) Western wall of Bilafond glacier; (8) Coolies throwing rocks into glacier lake between Ghyari and Naram; (9) Looking up the Bilafond glacier towards the Saltoro pass; (10) Lake above Ali Bransa; (11–18) Panorama from Saltoro pass, looking back down the Bilafond valley; (19) Bilafond peak; (20) Teram Kangri group; (21–29) Panorama from west end of base-line on upper Siachen glacier; (30) Looking up lower Siachen glacier from view point 14,300 feet; (31) Looking up lower Siachen glacier about 10 miles from snout; (32) Left edge of lower Siachen glacier overlapping into "empty nala"; (33) Looking up west branch of lower Siachen glacier; (34) Southern wall of Chumik glacier; (35) View north from Rgyong La, 18,700 feet; (36) Chulung stream; (37) Chulunka village on the lower Shyok river; (38) Upper part of Murgisthang glacier; (39) General view of lowest portion of Aktash glacier; (40) Snout of the Aktash glacier; (41) Aktash glacier; (42) Aktash glacier passing over the old pony-track; (43) Glacier advancing towards pony-track; (44) Kichik Kumdan glacier; (45) View from left bank of Kichik Kumdan; (46) Ice-cones on the Chong Kumdan glacier; (47) Panorama south and west from Chipchak plain; (48) Limestone ranges east of Shyok river.

N.B.—It would greatly add to the value of the collection of Photographs which has been established in the Map Room, if all the Fellows of the Society who have taken photographs during their travels, would forward copies of them to the Map Curator, by whom they will be acknowledged. Should the donor have purchased the photographs, it will be useful for reference if the name of the photographer and his address are given.

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Sketch Map to illustrate

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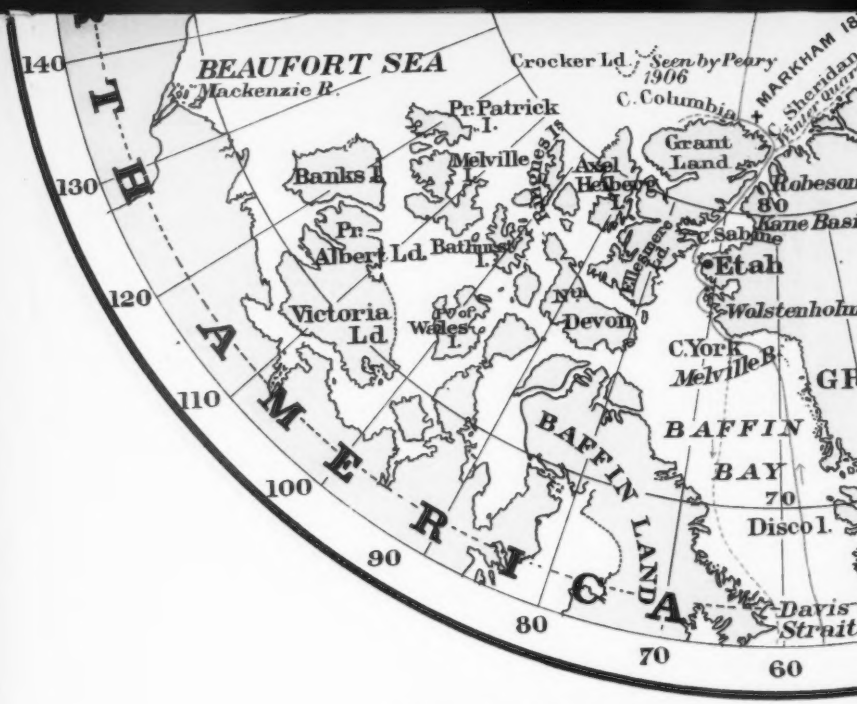

PROFILE OF SOUNDINGS FROM CAP

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1908 - 1909

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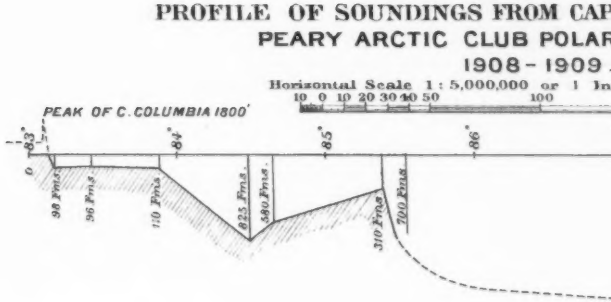

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Published by the Royal Geographi

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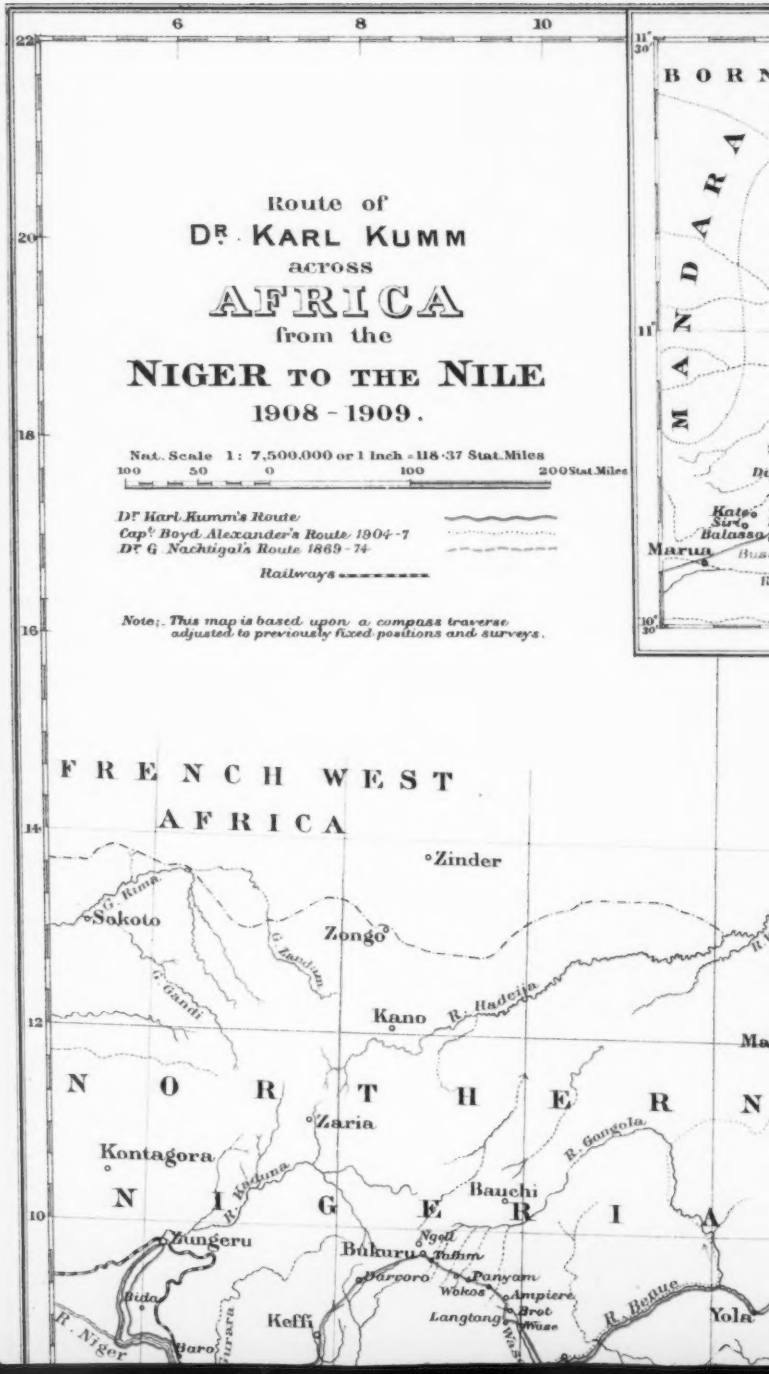
Route of
Dr. KARL KUMM
across
AFRICA
from the
NIGER TO THE NILE
1908 - 1909.
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Dr Karl Kumm's Route
Capt Boyd Alexander's Route 1904-7
Dr G. Nachtigal's Route 1869-74
Railways
Note:. This map is based upon a compass traverse adjusted to previously fixed positions and surveys.
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Marua
Kano R. Hadeija
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R. Benue
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Baro
Bida
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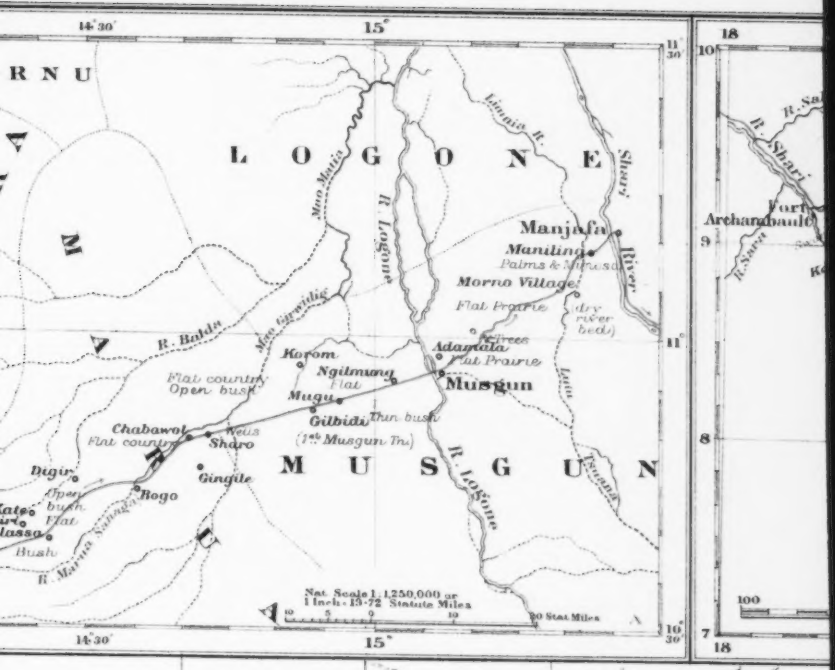
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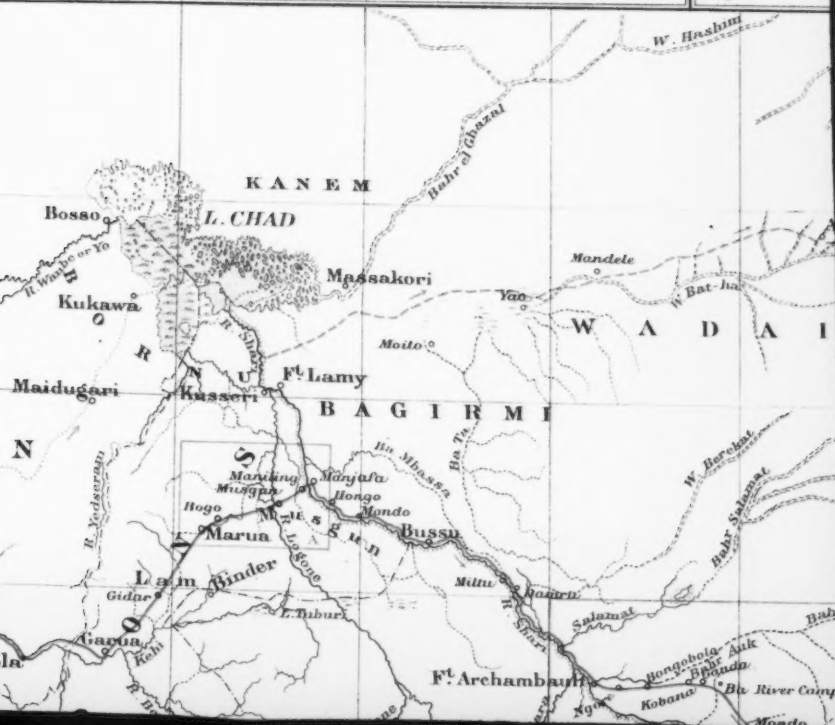
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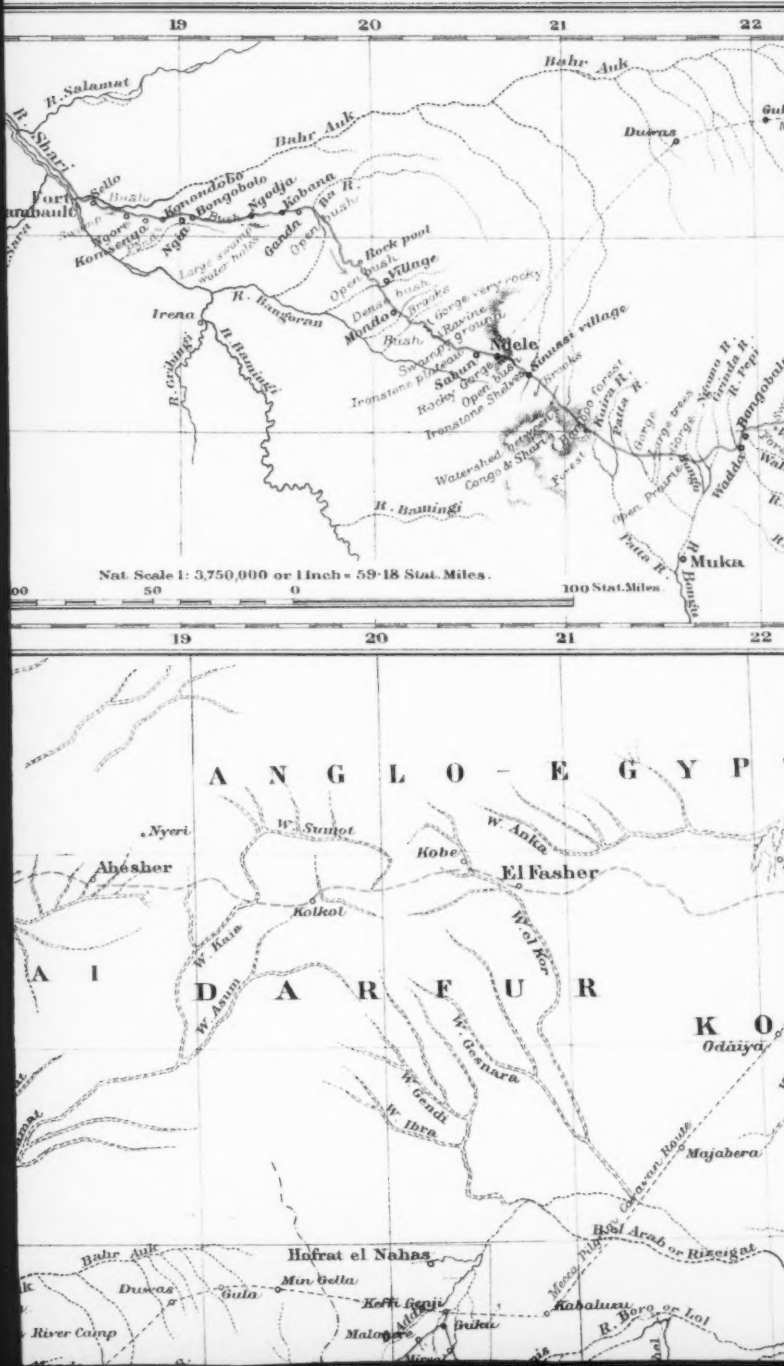
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Irena
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Nat. Scale 1: 3,750,000 or 1 inch = 59·18 Stat. Miles.
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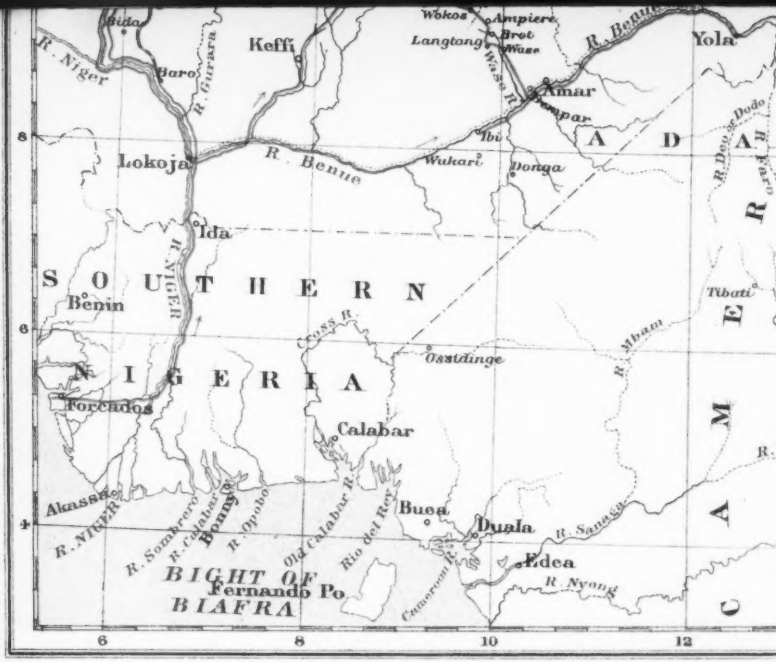
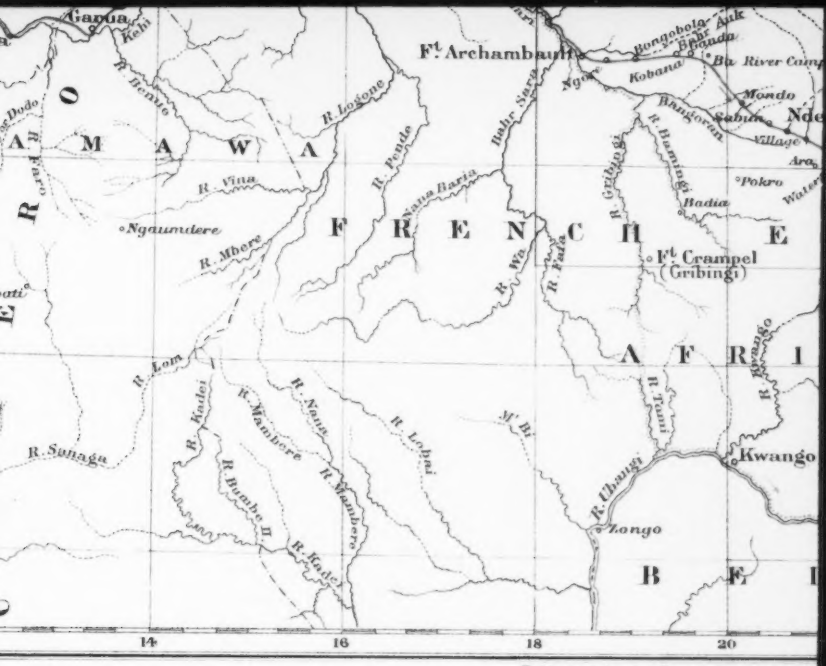
El Fasher
Kolkol
W. Kaia
W. Asum
D A R F U R
K O
Odaiya
W. Geanara
W. Gendi
W. Ibra
Majabera
Bahr Arab or Rizeigat
Hofrat el Nahas
Bahr Auk
Dusras
Gula
Min Gella
Kafir Kenji
Kabaluzu
River Camp
Malo
Buka
R. Boro or Lol

22
23
24
25
10
9
8
7
Hofrat el Nahas
R. Umbelasha
Gula
Mir. Gella
Mecca Pilgrim Caravan route to el Obeid
R. Adda
R. Rahad
Kafi Ganji
Gulau
Malagera
Imi R.
Hamdan
Mirsal Dabal
Ratwaka
Small hills
Pier R.
Deep Gorge
Bushes
Jungle
R. Baro
Mirika
Small hills 834-945 ft.
Wadi Rahad between Nile Congo & Shari
Patenga I.
Hills 1000 to 1500 ft.
Mero Rock 1000 ft
Ngoli R.
Kuruja ruins
Mangobole
Walakeki R.
R. Pepi
R. Amu
R. Kotto
R. Bangana
R. Ji
R. Shinko
R. Babada
R. Bah
Omdurman
Khartum
P T I A N S U D A N
Wadi Malik
Bara
Foja
El Obeid
HAHR EL ABIAD OR WHITE NILE
HAHR EL AZRAK OR BLUE NILE
El Nahud
Khor Abu Habl
O R D O F A N
Wadi el Ghalla
R. Shadana
Khor Gur
R. Adar
Kodok
Fashodah
Bahr el Homr
Faurel
Taufkia
WHITE NILE
R. Sobat
R. Kir
R. Lol
R. Jur
Bahr el Ghazal


Wokos
Ampiere
Bret
Wase
Langtang
R. Beauté
Yola
Keffi
Bida
R. Niger
Baro
R. Gurara
Amar
Ibi
A D A
Lokoja
R. Benue
Wukari
Donga
R. Dou or Dodo
Ida
S O U T H E R N
Benin
R. NIGER
Tibati
Cross R.
R. Mbam
N I G E R I A
Ossidinge
Forcados
Calabar
Akassa
R. NIGER
R. Somkrero
R. Calabar
Bonny
R. Opobo
Old Calabar R.
Rio del Rey
Buea
Duala
R. Sanaga
Idea
R. Nyang
BIGHT OF
BIAFRA
Fernando Po
Cameroon Mt.
C A M E
8
6
4
6
8
10
12



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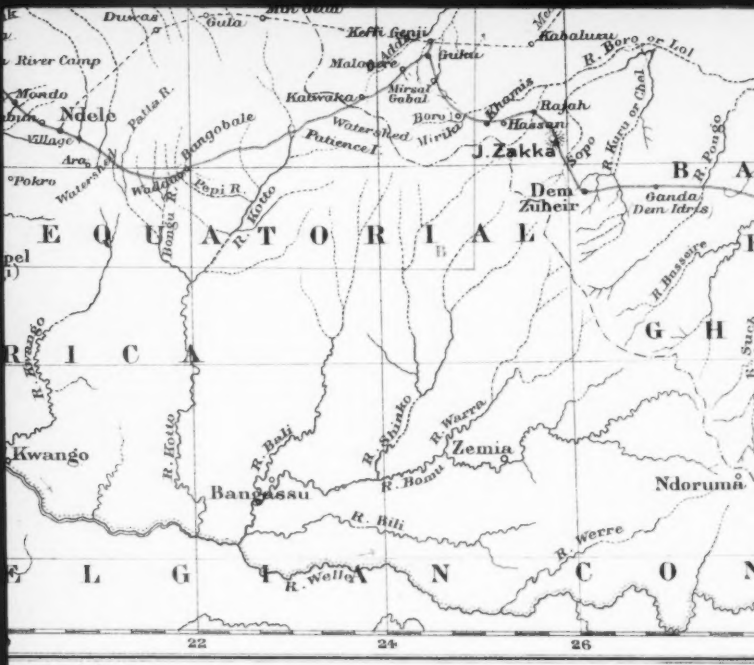
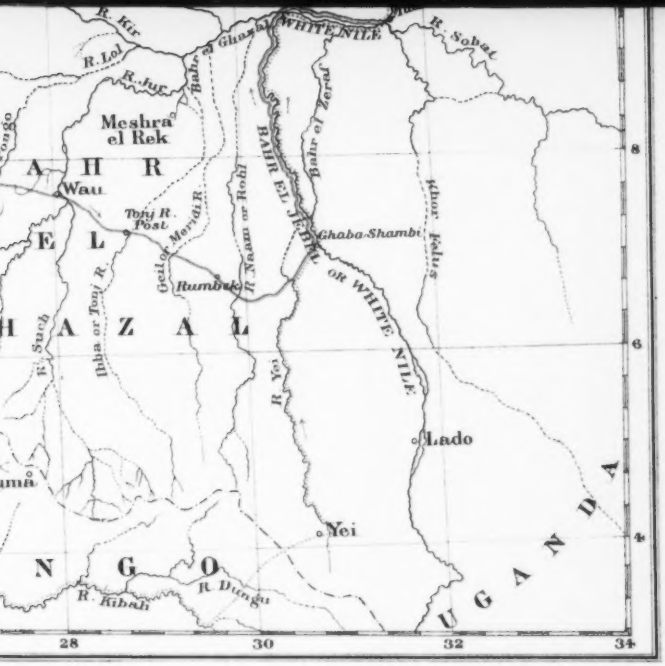
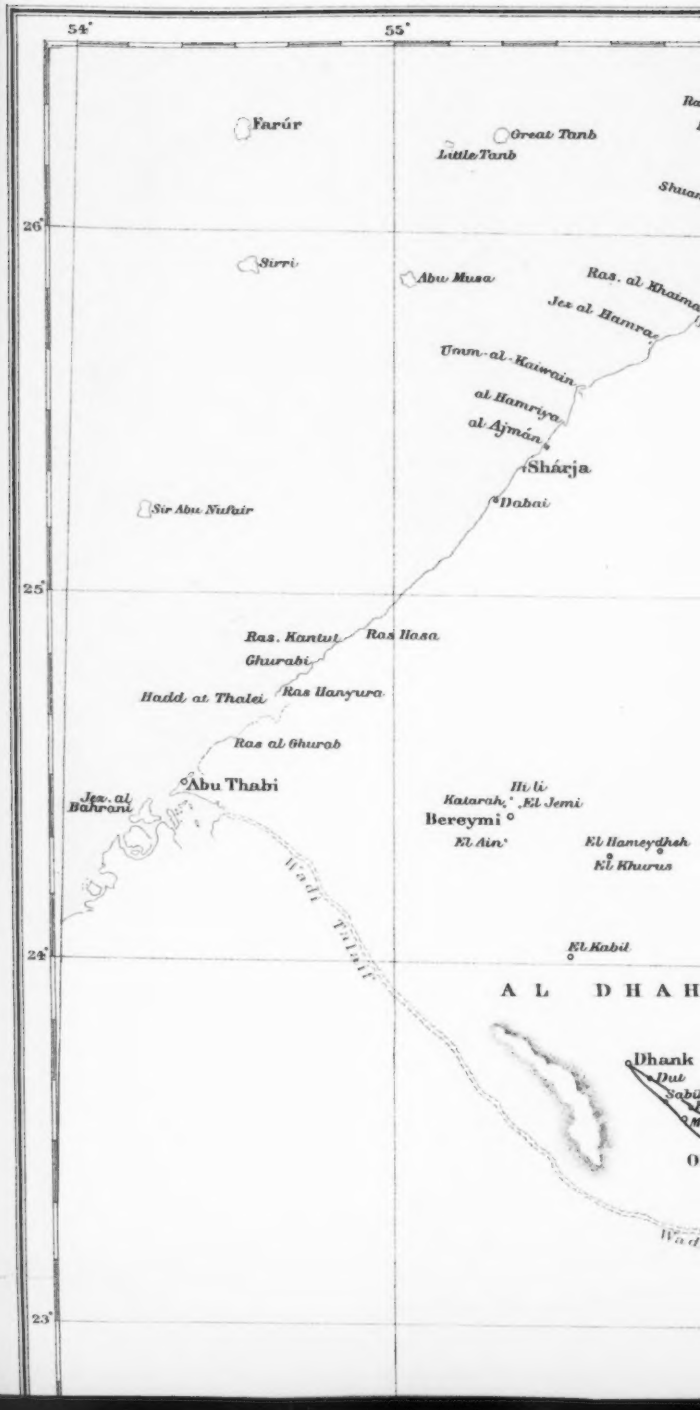


graphical Society.


R. Kir
R. Lol
R. Jur
Babr el Ghazal
WHITE NILE
R. Sobat
Meshra el Rek
Wau
Tony R. Post
Gelli or Merdi R.
Rumbek
R. Naam or Rohl
BAHR EL JEBEL
Babr el Zeraf
Ghaba Shambe
Khor Kelus
OR WHITE NILE
R. Yei
R. Sueh
Ibba or Tony R.
Lado
Yei
R. Kibali
R. Dungu
UGANDA
8
6
4
28
30
32
34


54°
55°
26°
25°
24°
23°
Farúr
Great Tanb
Little Tanb
Sirri
Abu Musa
Ras. al Khaima
Jez al Hamra
Umm-al-Kaiwain
al Hamriya
al Ajmán
Shárija
Dabai
Sir Abu Nufair
Ras. Kantut
Ras Hasa
Ghurabi
Hadd at Thalei
Ras Hanyura
Ras al Ghurab
Abu Thabi
Jez. al Bahrani
Bereymi
Kl Ain
Kl Jemi
Kl Hameydhah
Kl Khurus
Kl Kabil
Wadi Thalei
A L D H A H
Dhank
Dut
Sabú
O

56°
57°
Ras Sharitah
Jez-al-Ghanam
Kh. Ghub Ali
Khaur ash Shem
Ras Shaikh Masud
Ras al Jadi
Bakha
Shuam Point
Jez. Kish
Tawakkul
Jez Musandam
Ras Kabr Hindi
Duhat Shisah
Umm al Faiyarin
Ghubbet Shabús
Ghubbet Ghazirah
Duhat Kubal
Limah
Duhat Sharjeh
Duhat Hafteh
Karsheh
Dibbeh
Thadneh
Kashan
El Bedi
Zubareh
Khor Fakan
Sakamkam
El Fujeireh
Ghalat Kalbeh
Khor Kalbeh
Marer
Abu Bukareh
Khadrawein
Shinas
Hasifein
Nabar
Harmul
Mejis
El Fasikeh
Sohar
El Suweyhereh
Saham
Makheilif
Dil
Ras Hayari
al-Khaburah
el Abbasah
Village
Sur Butha Inland Hejriz of Al Soaq
Sur al Makaniyeh
Sur Thurraad
Wadi Shahr Shire
Wadi Mahawil
Wadi Jizzi
Wadi Ain
Wadi Mejnoun
Wadi Mejlis
Wadi Mejbeh
Wadi Mejbeh
Wadi Mejbeh

58° 59° 60°

26°

25°

24°

23°

ARABIA

MAP OF

OMAN

From route traverses and other information

By

LIEUT. COL. S. B. MILES.

Nat. Scale 1: 2,000,000 or 1 Inch = 31·56 Stat. Miles

10 0 10 20 30 40 50 60 70 80

Routes ———

O M A N

Makaniyeh

Jaz-Jun

Daimaniyat

Barkah

Sib

Hail Khaled

Ghobreh Fahil

Muttrah

MASKAT

Seeb

Bander Kasseh

Yiteh

Bander al Khiran

Ghubbet el Sifa

Sifa

Fanjeh

Wasit

Helbah

Nakhl

J. Hammand 7740

Dhaker al Badir

Ras Abu Daud

Kuryat

Ras Lowais

Semail

Saya

Ahwail

J. al Beidheh

J. Korn al Ram

Jerdeh

Wadi Tayin

Hail Ghaf or Devils Gap

Dhibab

Ramah

Ras el Shagar

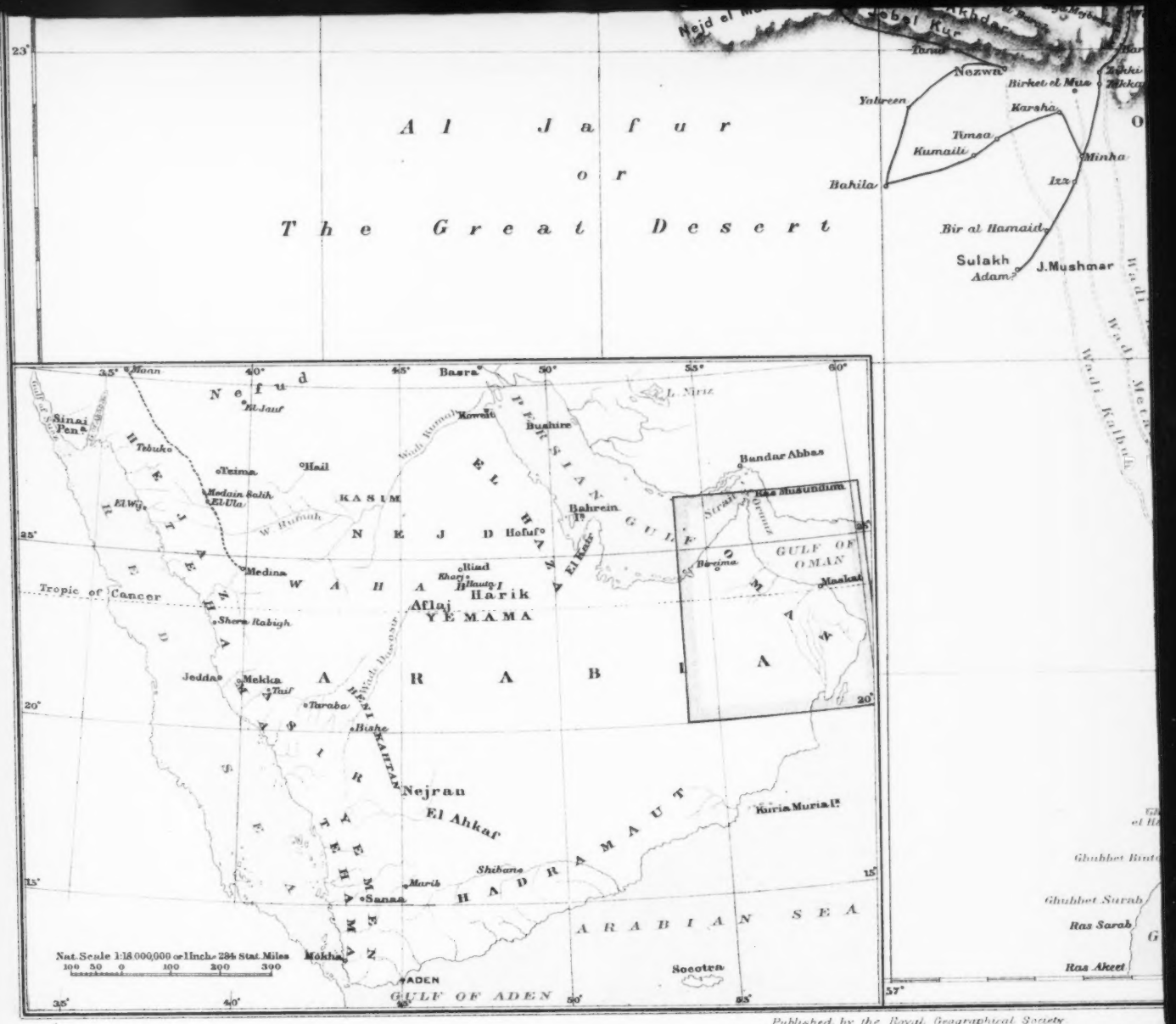
J. Beni Jabir

4400

Figs

Taiwa

Semed



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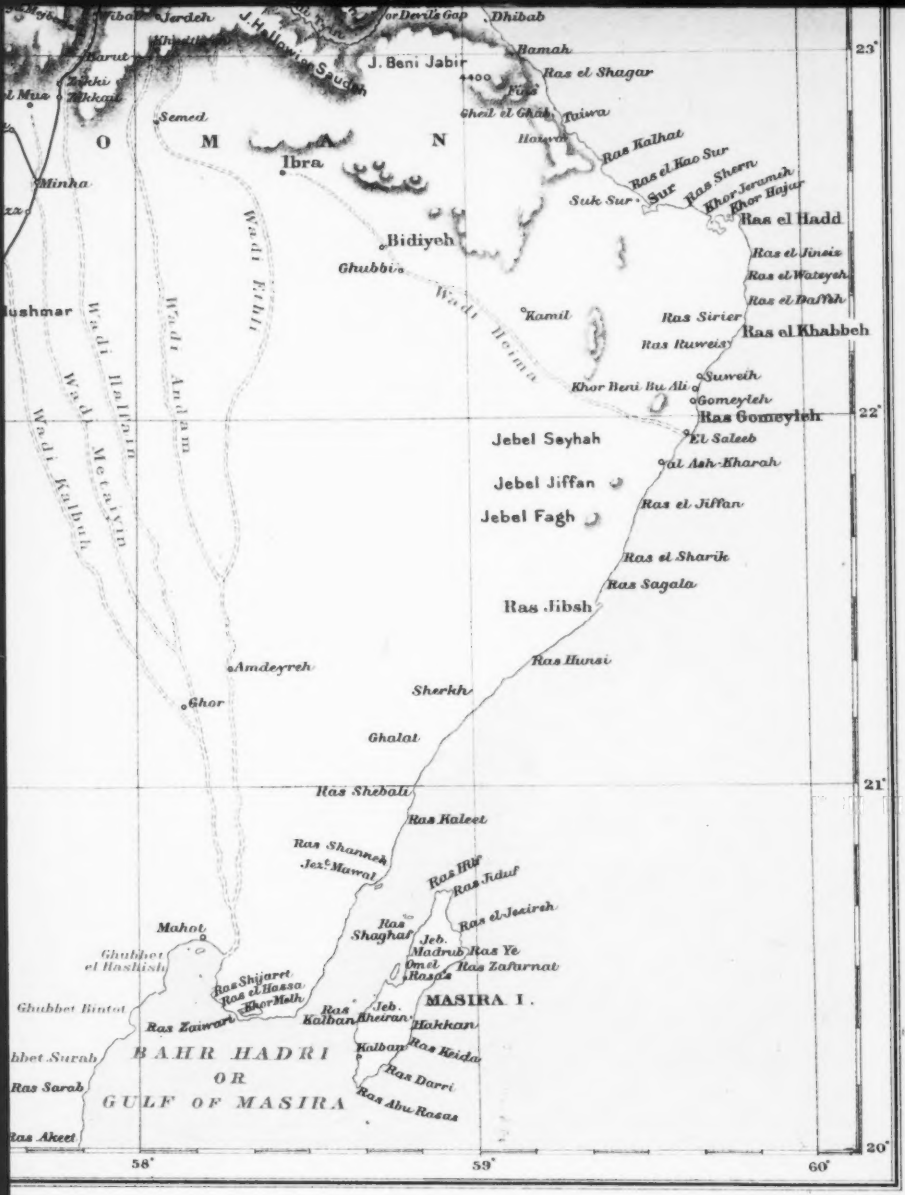
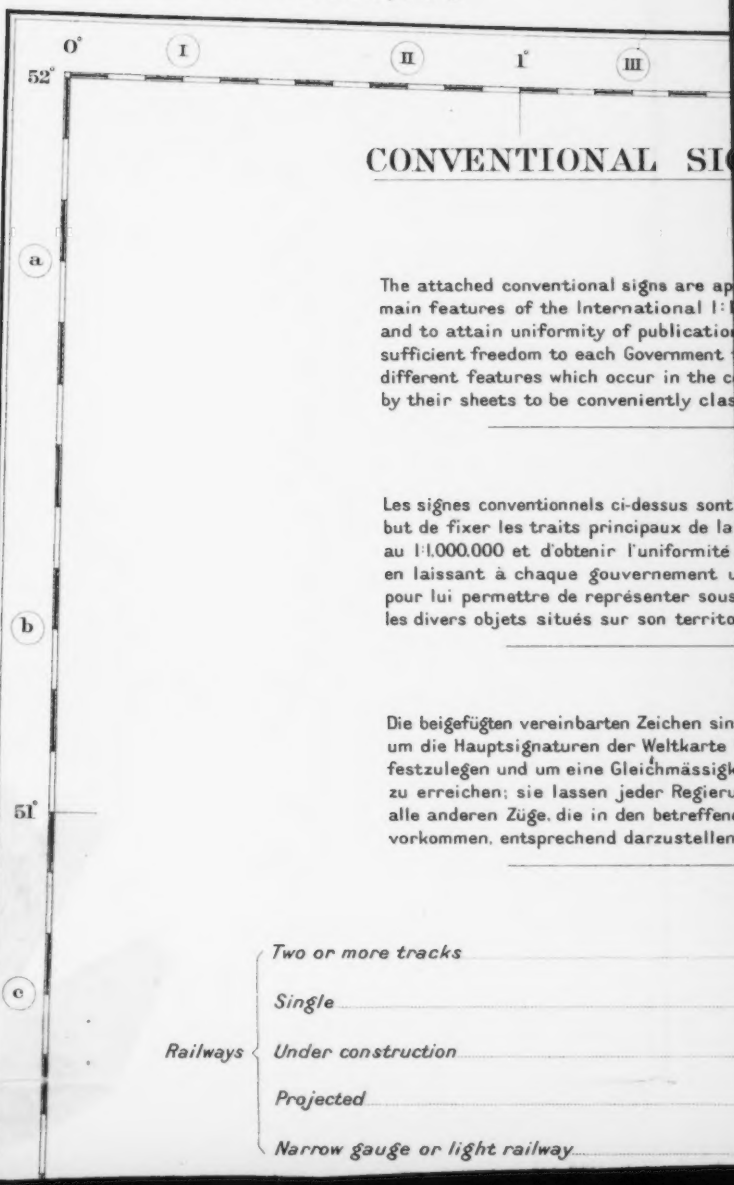

Dhibab
Ramah
Ras el Shagar
J. Beni Jabir
Semed
O M A N
Ibra
Minha
Wadi Bihi
Bidiyeh
Ghubbi
Wadi Hirma
Kamil
Ras Sirier
Ras el Khabbeh
Ras Ruweis
Suweih
Khor Beni Bu Ali
Gomeyleh
Ras Gomeyleh
El Saleb
Jebel Seyhah
Jebel Jiffan
Jebel Fagh
Ras el Jiffan
Ras el Sharik
Ras Sagala
Ras Jibsh
Ras Hunsi
Amdeyreh
Sherkh
Ghor
Ghalat
Ras Shebali
Ras Kaleet
Ras Shannah
Jez.t Mawal
Ras Huf
Ras Iduf
Ras el Jezireh
Mahot
Ras Shaghaf
Jeb. Madrub
Ras Ye
Ras Zafarnat
Ghubbet el Hashish
Ras Shijaret
Ras el Hassa
Khor Meih
Ghubbet Bintat
Ras Zaiwari
Ras Kalban
Jeb. Kheiran
MASIRA I.
Hakkan
Kalban
Ras Koida
Ras Darri
Ras Abu Rasas
BAHR HADRI
OR
GULF OF MASIRA
Ras Sarab
Ras Akeet
23°
22°
21°
20°
58°
59°
60°

EUROPE 1:1,000,000



CONVENTIONAL SI

The attached conventional signs are ap
main features of the International 1:
and to attain uniformity of publicatio
sufficient freedom to each Government
different features which occur in the c
by their sheets to be conveniently clas

Les signes conventionnels ci-dessus sont
but de fixer les traits principaux de la
au 1:1.000.000 et d'obtenir l'uniformité
en laissant à chaque gouvernement u
pour lui permettre de représenter sous
les divers objets situés sur son territo

Die beigefügten vereinbarten Zeichen sin
um die Hauptsignaturen der Weltkarte 1
festzulegen und um eine Gleichmässigke
zu erreichen; sie lassen jeder Regierun
alle anderen Züge, die in den betreffend
vorkommen, entsprechend darzustellen.

Railways
- *Two or more tracks*
- *Single*
- *Under construction*
- *Projected*
- *Narrow gauge or light railway*

PARIS

IV 2° V VI 3° V

SIGNS AND STYLES OF TYPE FOR THE INT

a are approved to fix the
ional 1:1,000,000 map
blication while leaving
rnment to enable the
in the countries represented
tly classified.

sus sont déterminés dans le
ux de la carte Internationale
iformité de publication, tout
nement une latitude suffisante
ter sous une forme convenable
territoire.

chen sind bestimmt worden,
tkarte 1:1,000,000
mässigkeit bei der Veröffentlichung
Regierung genügende Freiheit.
treffenden Ländern
stellen.

1 PROVENC

2 BERLIN

3 Meran Museum Kehl

4 MOUNTAIN VALLEY Pass Is

5 *RIVER Stream*

6 *RAILWAY STATION (STA.)*

7 TURKHANA

8 PARIS

Chemin de fer — *à deux ou plusieurs voies*
en exploitation
en construction — Eisenbahne
en projet
à voie étroite

S

VII VIII 4° IX X 5°

NTERNATIONAL MAP ON THE SCALE OF 1:1,0

1	Roman capitals. Open lettering shall be used for names of Countries and Provinces.
2	Roman capitals for Capitals of Countries and Towns of first importance.
3	Roman lower case for Towns and Villages of lesser importance and names of localities.
4	"Block" or "Egyptian" capitals or lower case for Mountains, Peaks, Hills, Headlands, Points, Capes, Passes, Valleys, Canyons, Islands, Prairies, Forests, Sand-dunes, Plateaux.
5	"Stump" Sloping Roman capitals or lower case in blue for Hydrography.
6	Sloping Egyptian capitals in lighter style than 4 for Railways, Stations, Roads, Bridges, Fords, Ferries.
7	Finished upright thick hairline capitals for Tribal names.
8	Open Roman capitals shaded for Titles of sheets.

1	Capitale en lettr… Contrées et de P…
2	Capitale droite po… de Villes importan…
3	Romaine droite p… les Bourgs et Vill…
4	Capitale-bâton et … Pics, Collines, Pro… Gorges, Iles, Prair…
5	Capitale, romaine … l'Hydrographie.
6	Capitale-bâton pe… Stations, Routes, P…
7	Capitale Antique
8	Capitale grisée po…

NCE

1	Kapitalschrift, hohl, wird verwendet für namen von… Ländern und Provinzen.
2	Kapitalschrift für Landeshauptstädte und wichtig… Städte.
3	Römische Schrift für Städte von geringerer Bedeu… Dörfer, und Namen von Gegenden.
4	Balkenschrift für Berge, Spitzen, Hügel, Vorgebirge … Landspitzen, Engwege, Täler, Schluchten, Inseln, Steppen, Wälder, Sanddünen, Hochflächen.
5	Schrägstehende römische Schrift, blau in grossen oder… Buchstaben für die Gewässer aller Art.
6	Schrägstehende Balkenschrift mit grossen Buchsta… für Eisenbahnen, Bahnhöfe, Wege, Brücken, Furten, Fäl…
7	Starke Haarschrift, mit grossen Buchstaben für Stamm…
8	Kapitalschrift, hohl und gestrichelt, für die Namen der B…

ss Island

TA.)

ahnen

mit zwei oder mehr Geleisen

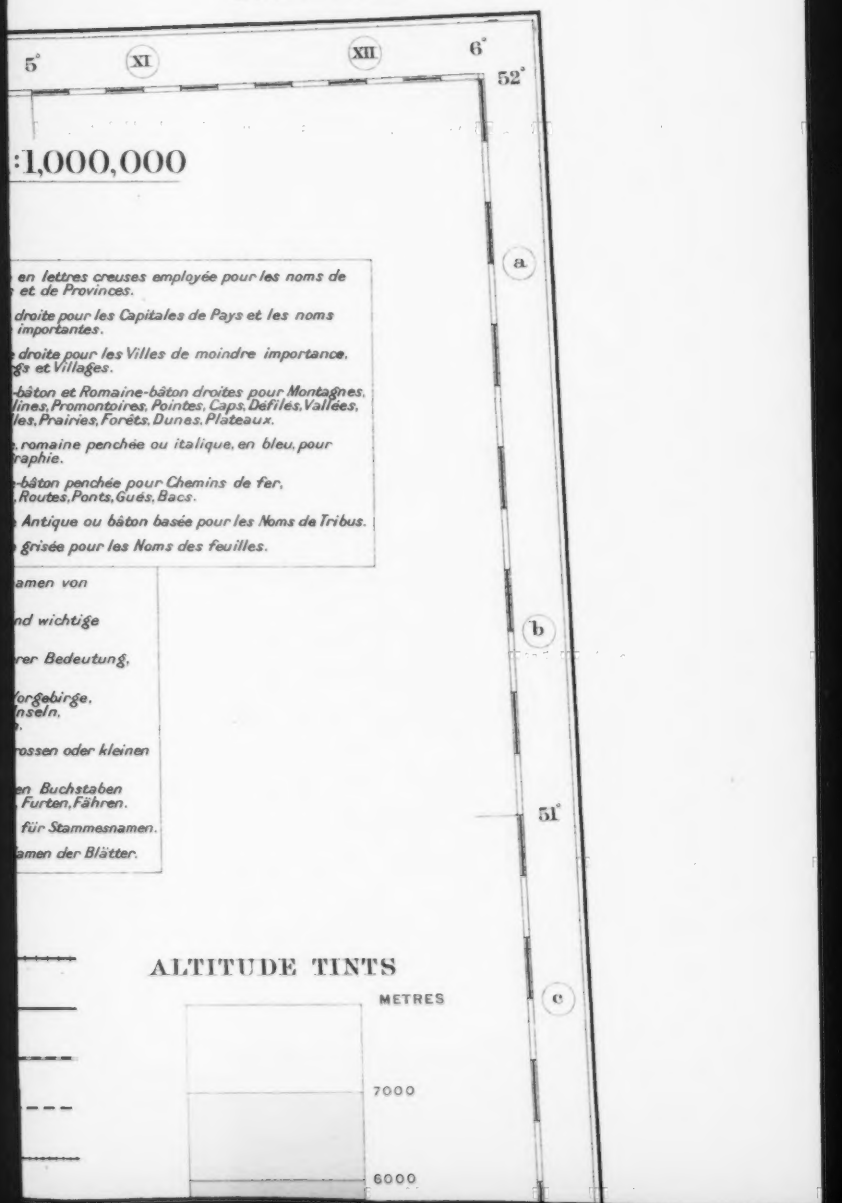
eingeleisig STA.

im Bau

vorgeschlagen

schmalspur-bahn

NORTH M 31


5°
XI
XII
6°
52°
:1,000,000
en lettres creuses employée pour les noms de
et de Provinces.
droite pour les Capitales de Pays et les noms
importantes.
droite pour les Villes de moindre importance,
gs et Villages.
-bâton et Romaine-bâton droites pour Montagnes,
lines, Promontoires, Pointes, Caps, Défiles, Vallées,
les, Prairies, Forêts, Dunes, Plateaux.
, romaine penchée ou italique, en bleu, pour
raphie.
-bâton penchée pour Chemins de fer,
, Routes, Ponts, Gués, Bacs.
Antique ou bâton basée pour les Noms de Tribus.
grisée pour les Noms des feuilles.
amen von
nd wichtige
rer Bedeutung,
Vorgebirge,
Inseln,
rossen oder kleinen
en Buchstaben
, Furten, Fähren.
für Stammesnamen.
amen der Blätter.
a
b
51°
c
ALTITUDE TINTS
METRES
7000
6000

Projected

Narrow gauge or light railway

Roads, paths &c
- 1st class roads
- 2nd " "
- 3rd " "

(For wheeled traffic)

Tracks, not fit for wheeled traffic

(d)

Rivers
- Perennial
- Non-perennial
- Unsurveyed
- Navigable

50°

Falls

Rapids

Limit of navigation

(e)

Canal, navigable

" non-navigable

Marsh (fresh)

" (salt)

Telegraph along road

" (not along road)

Telegraph or Telephone Office

(f)

Post Office

Where both Telegraph or Telephone & Post Office exist

Boundaries, International

" Provincial

49°

Town-stamp for Towns of 1st importance

" " " " 2nd class importance

" " " " 3rd " "

" " " " 4th " "

(g)

" " " " 5th " "

Woods, Forests

en projet	
à voie étroite	
Routes, chemins — Ire Classe, Carrossable	Fahrstrasse
2e " "	"
3e " "	Fahrweg
Sentiers, non carrossables	Strassenzüge
Fleuves — à cours permanent	Fluss — best
à sec une partie de l'année	zeit
non levés	nich
navigables	schi
Chutes de fleuve	Wasserfall
Rapides	Stromschnell
Limite de navigation	Endpunkt der
Canal navigable	Schiffahrtska
" non-navigable	Bewässerungs
Marais (d'eau douce)	Frischwasser
" (salant)	Salzsumpf
Ligne télégraphique le long des routes	Telegraphenl
" " ne suivant pas les routes	Telegraphenl
Bureau de télégraphe ou téléphone	Telegraphen-
Bureau de poste	Postamt
st Bureau de poste avec télégraphe ou téléphone	Wo sich Teleg
Limites d'état	Landesgrenze
" de province	Provinzgrenz
Villes de Ire Ordre	Stadtzeichen
" " 2e "	"
" " 3e "	"
" " 4e "	"
Bourgs, Villages importants	"
Bois, Forêts	Wald

vorgeschlagen

schmalspur-bahn

asse — I Klasse

— II „

— III „

zzüge, unfahrbar

beständig

zeitweilig rinnend

nicht aufgenommen

schiffbarer Fluss

all

hnellen

t der Schiffbarkeit

rtskanal

rungskanal

ssersumpf

pf

henlinie an Strasse entlang

henlinie

hen-oder Fernsprech-Amt — T

— P

Telegraph oder Telephon und Postamt befinden — P

renze

grenze

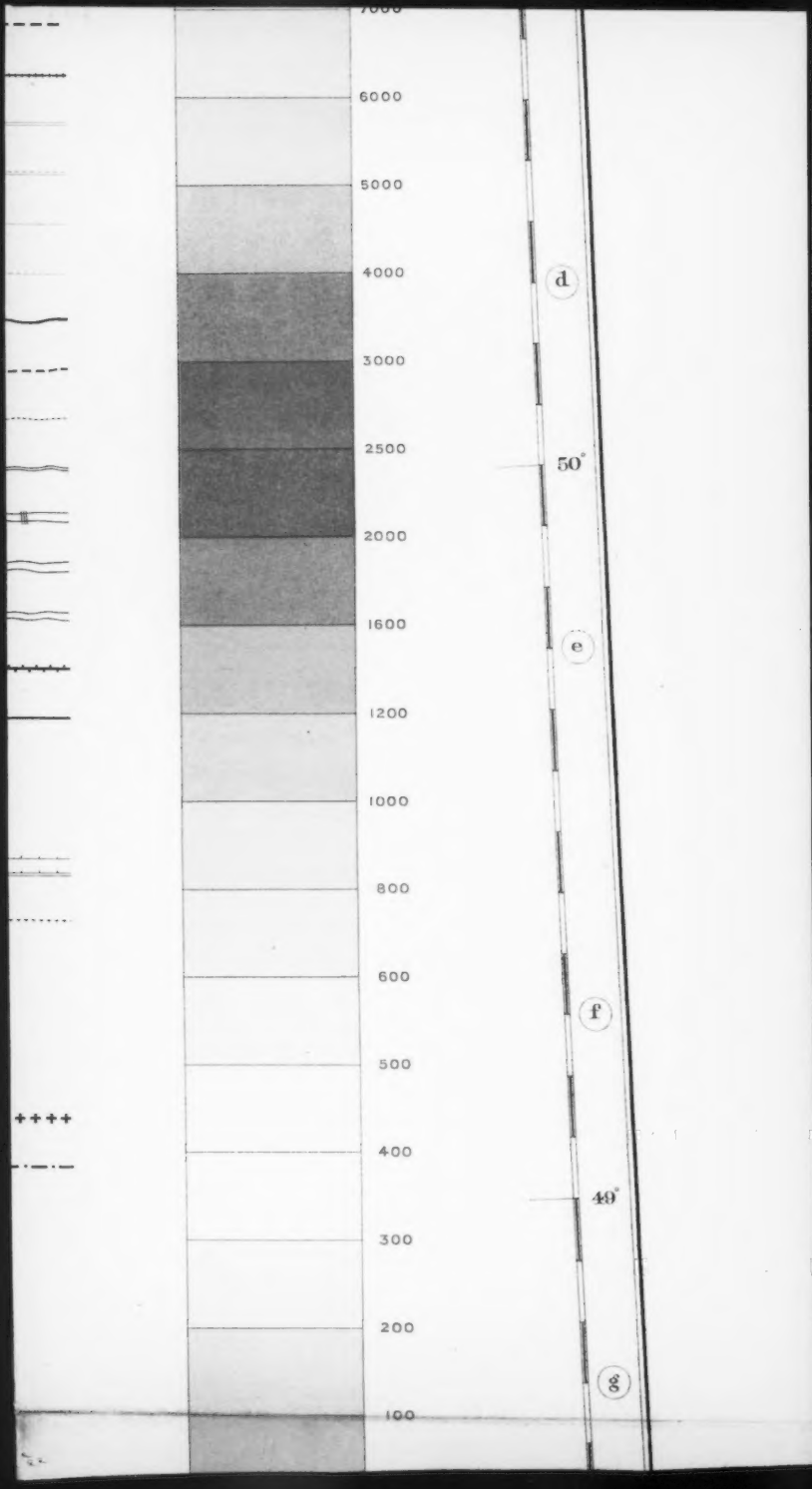
chen für Städte, I Ord.

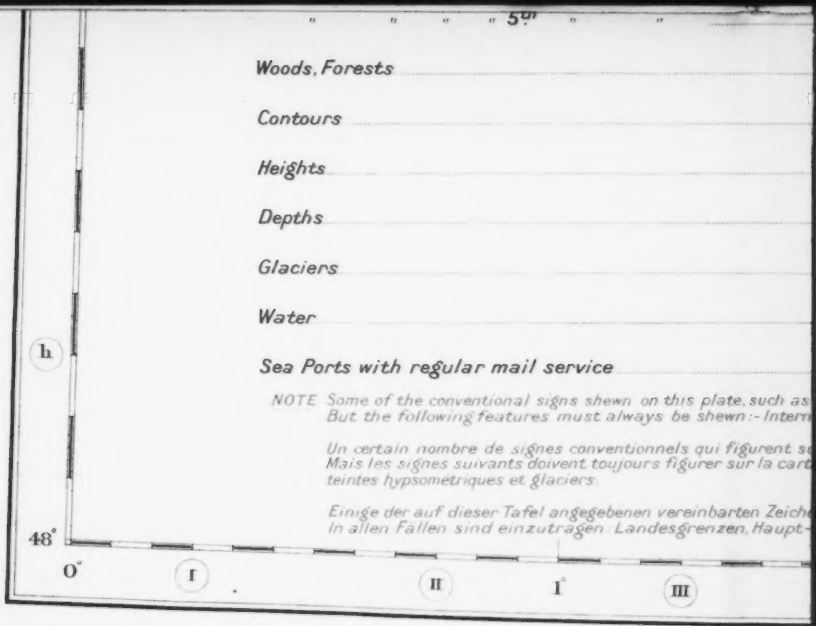
„ „ II „

„ „ III „

„ „ IV „

„ „ V „


6000
5000
4000
3000
2500
2000
1600
1200
1000
800
600
500
400
300
200
100
d
50°
e
f
49°
g



Printed at

Dec. 1st 1870

Reference
(Legende)
(Zeichen Erklärung)

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Bourgs, Villages importants	
Bois, Forêts	Wald
Courbes de niveau	Schichtlinie
Altitudes	Höhen
Profondeurs	Tiefen
Glaciers	Gletscher
Eaux	Gewässer
Ports maritimes avec service postal régulier	Seehäfen m

ich as Telegraph lines, Minor roads, Streams and Canals, should be omitted in those cases in which the
International Boundaries, Main Roads and Lines of Railway, Navigable Rivers and Canals, Limits of Navig

ent sur ce tableau tels que: Lignes télégraphiques, chemins de peu d'importance, ruisseaux et canaux ne ser
e carte: Frontières internationales, principales lignes de chemins de fer et grandes routes, rivières et canaux

Zeichen, z. B. Telegraphenlinien, unbedeutende Fahrstrassen, Flüsse und Kanäle sind fortzulassen falls i
aupt-Eisenbahnen und Fahrstrassen, schiffbare Flüsse und Kanäle. Grenzen der Schiffbarkeit. Höhen, T

Scale (Échelle, Mafsstab) 1:

Kilometres 10 5 0 10 20 30 40 50 60

1 Millimetre = 1 Kilome

Miles 10 5 0 10 20 30

Scale 1 Inch to 15·78
or 1·014 Inches to 16

INDEX TO ADJOINING SHEETS

NAME N.30	NAME N. 31	NAME N.32
NAME M.30	3° E. 50° N. 50° N. 3° E.	NAME M.32
NAME L.30	NAME L. 31	NAME L.32

tlinien 1000

..... 127

..... 127

her .....

ser .....

fen mit ständiger Postverbindung .....

the insertion of such detail would encumber the sheet.
Navigation, Heights, Depths, Contours, Hypsometric layer tints, Glaciers

ne seraient pas représentés dans le cas où ils devraient surcharger la carte.
anaux navigables, limites de navigation, altitudes et profondeurs, courbes de niveau,

Falls ihre Eintragung die Uebersicht des Blattes behindern würde.
hen, Tiefen, Schichtlinien, Farbenabstufung der Höhenschichten, Gletscher.

VII VIII 4° IX X

1:1,000,000

60 70 80 90 100 110 Kilometres

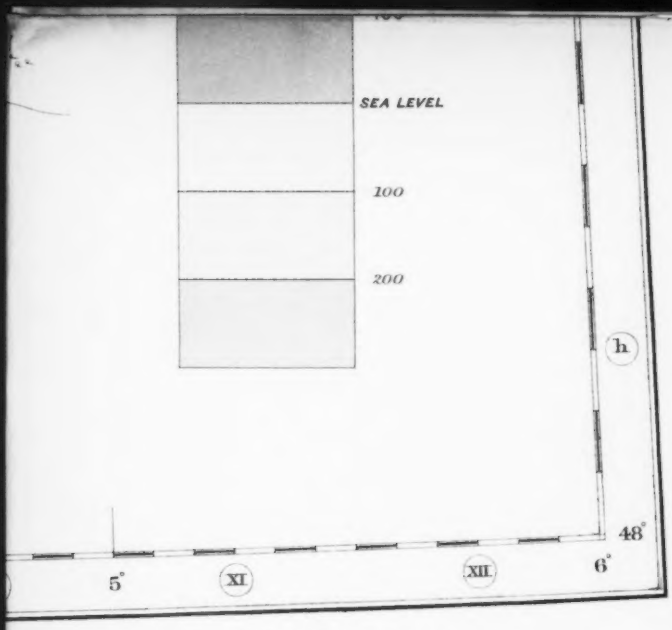
lometre

40 50 60 70 Miles

578 Miles
16 Miles

SHEETS

NAME N.32
NAME M.32
NAME L.32

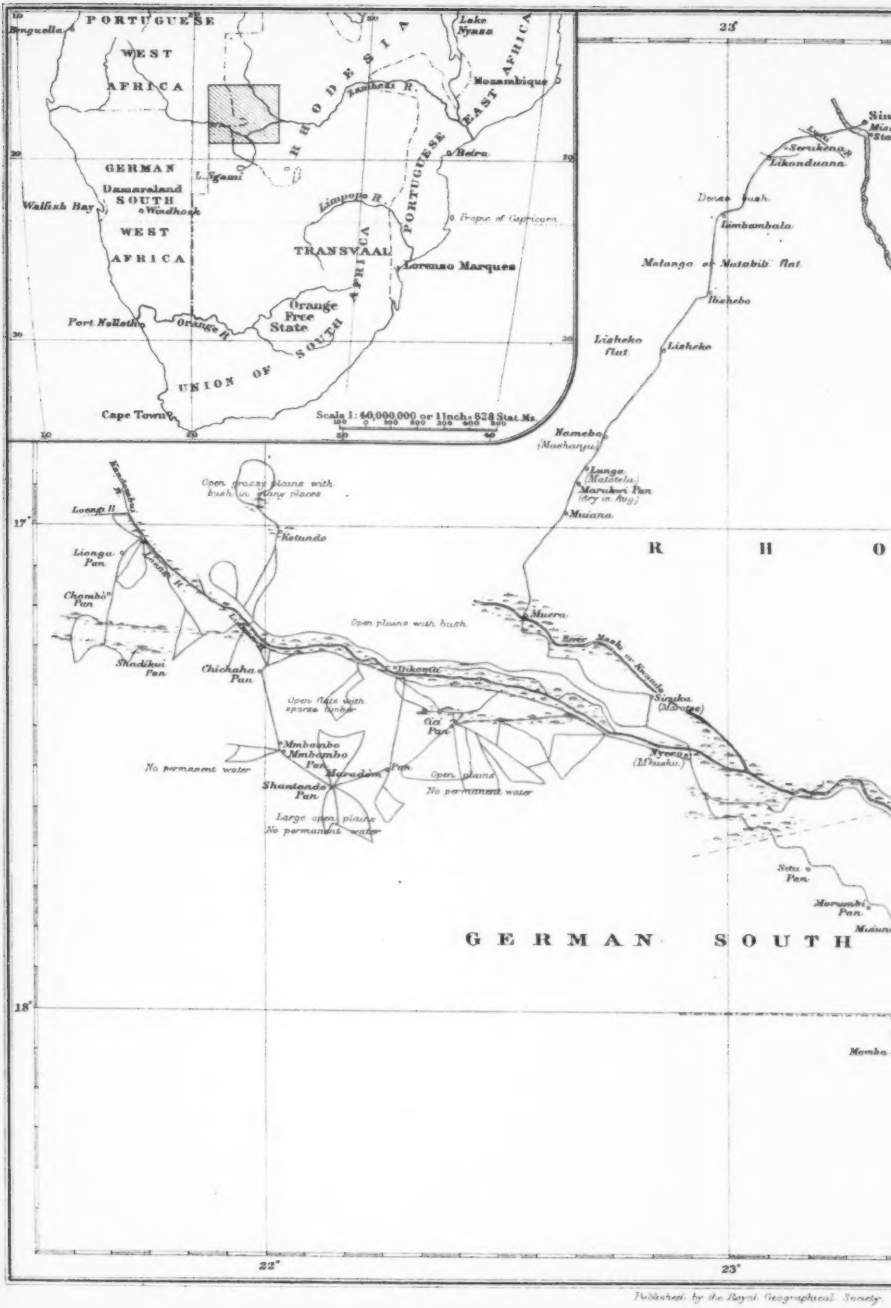


Compiled from { Carte de France 1:200000
Karte des Deutschen Reiches 1:100000
Carte de la Belgique 1:40000
Atlas van het Koninkrijk der Nederland 1:200000
Ordnance Survey of Great Britain 1:253440 }

Reference
(Légende)
eichen Erklärung)

Drawn in the Geographical Section, General Staff, War Office, London, to illustrate the Conventional Signs and Styles of Type approved by the International Map Committee assembled at the Foreign Office, London, in November, 1909.

Engraved for the G.S.G.S. by Messrs John Bartholomew & Co., Edinburgh, March, 1910.



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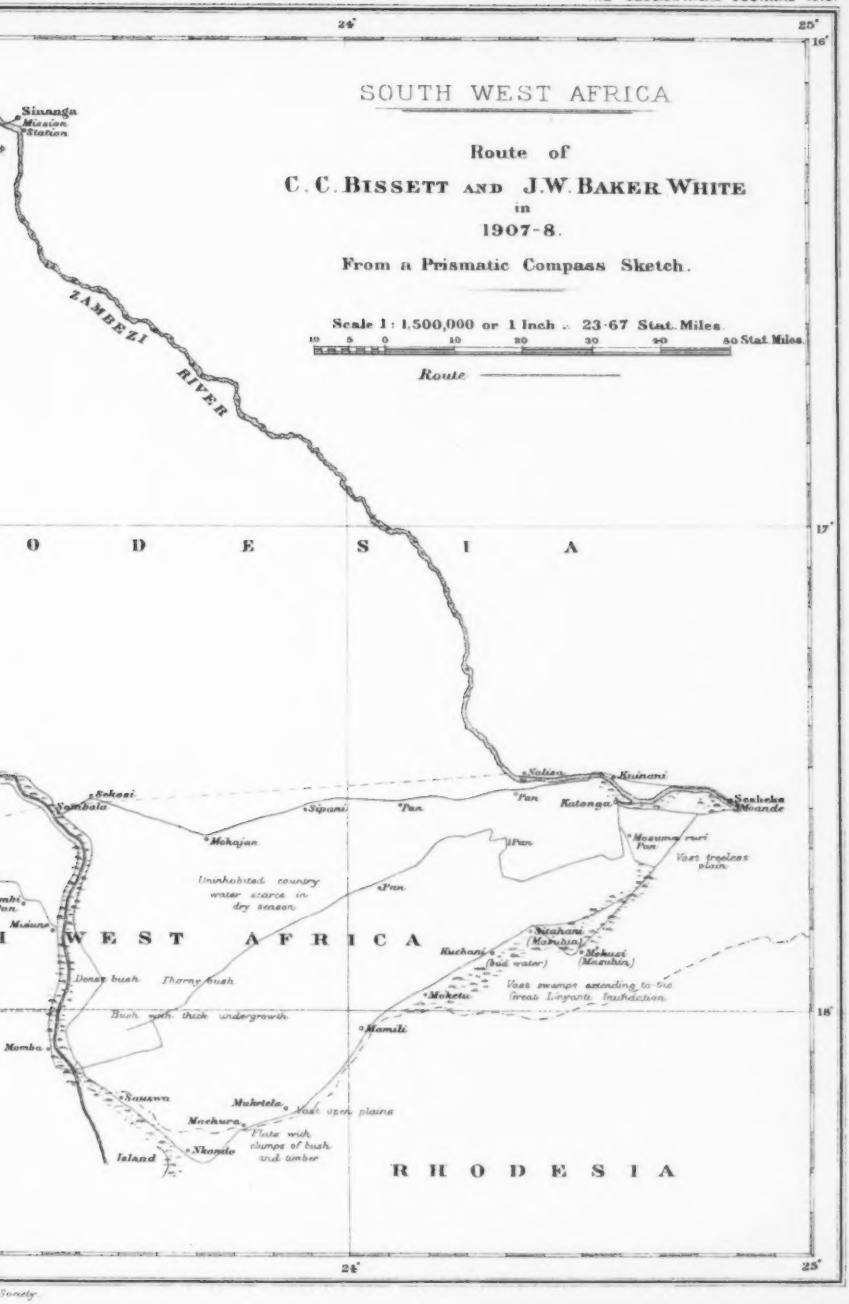
24°
25°
16°
17°
18°
SOUTH WEST AFRICA
Route of
C. C. BISSETT AND J. W. BAKER WHITE
in
1907-8.
From a Prismatic Compass Sketch.
Scale 1 : 1,500,000 or 1 Inch = 23·67 Stat. Miles.
10 5 0 10 20 30 40 50 Stat. Miles.
Route
Simanga Mission Station
ZAMBEZI RIVER
O D E S I A
Sekosi
Nambala
Sipani
Pan
Mokajan
Pan
Katonga
Kwinani
Sesheke Moande
Maoma ruri Pan
Vast treeless plain
Uninhabitat country water scarce in dry season
Pan
Kachani (Mandura)
Kachani (bad water)
Makusi (Mandura)
Vast swamps extending to the Great Linganti Inundation
Maketu
Mamili
Donga bush
Thorny bush
Bush with thick undergrowth
Mamba
Sanawa
Mukotela
Mochuru
Island
Most open plains
Flute with clumps of bush and timber
WEST AFRICA
RHODESIA

Surely